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THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Shell Variation and Species Determination in the Genus *Nautilus*

Dr. Kent Trego of Stanford University, whose current research is on cephalopods, will give a slide show on the many variations in Recent nautiloids including the Chambered and Paper Nautilus.

Shells of the month: Cephalopods (*Nautilus, Argonauta, Sepia* and *Spirula*)

Meeting date: January 21, 1992

CONTENTS

CLUB NEWS

Dues are Due for 1993

Dues are now due and payable for 1993 to The San Diego Shell Club. Please send to the Club address shown on the masthead. All domestic memberships are $12; overseas (surface mail) $15; overseas (air mail) $30. All memberships include one copy of **The Festivus** per family. Those not renewing by the end of January will not receive the February issue or be included on the membership roster. All memberships received after the end of October 1992 were applied to 1993.

From the Minutes - San Diego Shell Club Meeting - November 19, 1992

President Jules Hertz opened the meeting by introducing new members and guests after which the election of officers for 1993 was held. The new officers are: President, Carole Hertz; Vice President, Hugh Bradner; Treasurer, Linda Hutsell; Recording Secretary, Terry Arnold; Corresponding Secretary, Rick Negus.

Jules reminded members that dues are due for 1993 and then gave information on the upcoming Christmas Party.

Kim Hutsell outlined a proposed School Kit Project for the Club in which local shells and teaching materials would gradually be provided to selected elementary school grades to encourage greater knowledge and conservation of our marine environment. The proposal was met with interest and several people offered their help.

Terry Arnold introduced Don Shasky, the speaker for the evening, who gave an informative and entertaining program, with beautiful slides, on diving in the Marshall Islands on the atolls of Majuro and Arno. He told of some of the problems encountered in arranging for dives, some of the perils of diving at Arno, and he brought in a beautiful display of shells he collected in the Marshall Islands. The program was enjoyed by all.

After the shell drawing, won by Ed Boyd, members and guests enjoyed a social hour with refreshments provided by the families Flentz, Klaus and Yeend.

The Annual Christmas Dinner Party

A wonderful time was had by all! Members and guests in their holiday finery gathered in the upstairs room of the Shanghai Restaurant. Gifts for exchange were placed under the tree provided by Kim and Linda Hutsell. Holiday music (also courtesy of the Hutsells) played in the background as friends animatedly greeted each other.

After the cocktail hour, members enjoyed a bounteous Chinese dinner at festive tables, with colorfully wrapped holiday favors of jellies and jams made by Margaret Mulliner.

Master of Ceremonies Kim Hutsell welcomed everyone and introduced outgoing President Jules Hertz who briefly reviewed the Club 1992 achievements and thanked his board and committee members for their contributions. Carole Hertz expressed her appreciation to the Club for its support of **The Festivus** and introduced Carol Skoglund, the author of the ambitious supplements updating Keen's book. Then Kim introduced the 1993 board and the gavel was passed to new president Carole Hertz.

Following was a slide show with contributions by several members. Outstanding slides of Gulf and Cocos Island were shown by Dave Mulliner and Joyce Gemmell narrated a wonderful selection of her slides of early San Felipe before the tourist boom. After the slides, Kim announced the traditional gift exchange, always a highlight of each Christmas party. Everyone lingered after the gift exchange, examining and admiring all the gifts and wanting the party to last a bit longer.

Wes Farmer Announces Two New Pamphlets

Club member Wes Farmer has written, illustrated and published two new 4x5.5 pamphlets for beginners entitled BEACHCOMBING BETWEEN TIDES and DID YOU KNOW THAT? BAJA SEA SHELLS OF THE NORTHERN SEA OF CORTEZ. Both contain 24 pages with line drawings and both are priced at $4.25.
Contact Wes Farmer, 3591 Ruffin Road #226, San Diego, CA 92123 [619-576-2143].

XENOPHORIDAE OF MADAGASCAR AND SOUTHEAST AFRICA

KATHARINE STEWART

California Academy of Sciences, Golden Gate Park,
San Francisco, California 94110

INTRODUCTION

The discovery of a new species of *Xenophora* from the southwest coast of Madagascar which does not correspond to any described species (manuscript in preparation) led to this study of the *Xenophora* of Madagascar and southeast Africa. For this paper four types from the Natural History Museum, London (BMNH) and 105 specimens from my collection were studied. A specimen of *X. cerea* (Reeve, 1845), well known in the tropical Indo-Pacific, is recorded for the first time from Madagascar.

DISCUSSION

In March 1989, on a trip to Madagascar organized by Don Pisor of San Diego, California, collectors found, in the Tulear shell market, specimens of an unusual *Xenophora* that differed from any known species (Figures 1 & 2). These shells were collected off the Tulear coast, southwest Madagascar, in mud, probably in shallow water. Eight specimens were studied, ranging in size from 48 to 60 mm (measurements do not include attached material). The dorsum is densely clothed in attachments, largely broken pieces of bivalves, evenly arranged and almost entirely obscuring the whorls. The spire is shallow, 45-50 degree angle. The base is brown, sculptured with strong spiral ribs on the inner half, crossed by collabral lines (growth lines conforming to the shape of the outer lip), nodose at the junctures. The umbilicus is closed. A description of this species is in preparation.

Figure 1. *Xenophora* sp. undet., top view. 59.8 x 31.7 mm. Location: southwest Madagascar. K. Stewart collection.

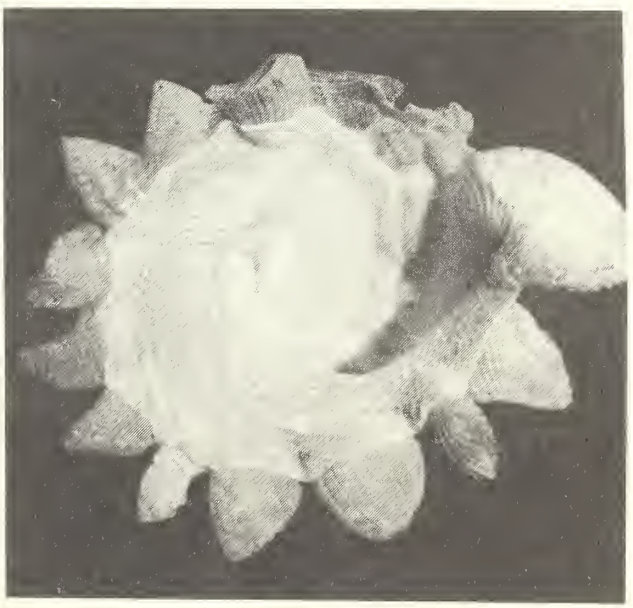


Figure 2. *Xenophora* sp. undet., showing basal view of specimen in Figure 1.

Other species of *Xenophora* previously recorded from Madagascar are *X. gigantea* Schepman, 1909; *X. solarioides* (Reeve, 1845); *X. indica* (Gmelin, 1791); and *X. pallidula* (Reeve, 1842). Two species, *X. corrugata* (Reeve, 1842), and *X. (Stellaria) solaris* (Linnaeus, 1764), are recorded from southeast Africa, but not found in Madagascar.

There are two forms of *X. pallidula*. One, from the Philippines and much of the Indo-Pacific (Figures 3 & 4), has a light build, may be as large as 87 mm in diameter, and arranges its attachments, often long pointed shells, regularly, in a downward slant so that the shell is resting on the points of the attachments and the foot is off the ground except when grazing. They move in what has been called a "leaping motion", thus leaving no continuous trail for predators to follow (St. Jean, pers. comm.). It is white with about half the dorsum exposed. The base is marked with collabral lines which are faintly gemmate. The umbilicus is partially covered by the lip.

Xenophora pallidula trawled in waters off Natal, South Africa (Figures 5 & 6), generally has a very heavy shell and may be as large as 95 mm in diameter. The animal attaches not only shells, but also rocks and lumps of coal, brought to the area by coal barges. The tan base has heavy collabral lines and a partially covered umbilicus. Ms. Kathie Way of the Natural History Museum, London, noted that the figured syntype (BMNH 1950.8.28.17) (Figures 7 & 8) "cannot be considered as a holotype since Reeve makes it clear that more than one specimen was available to him." Ponder (1983) selected the lectotype (Figures 7 & 8) and paralectotypes. The type locality is Japan. The species is distributed in the Indian Ocean, central Indo-Pacific, and northwest Australia. There is a record of this species from the west coast of Madagascar (Ponder, 1983).

Xenophora gigantea (Figures 9 & 10) has a large shell. The holotype in the Zoological Museum, Amsterdam. (ZMA 2532, Flores Sea, Indonesia) measures 98 mm diameter by 60 mm height. A similar specimen has a spire angle of 52 degrees. It is a thin shell for its size, with a wide peripheral flange, a deep open umbilicus sometimes partially covered by the growing lip. The base shows weak

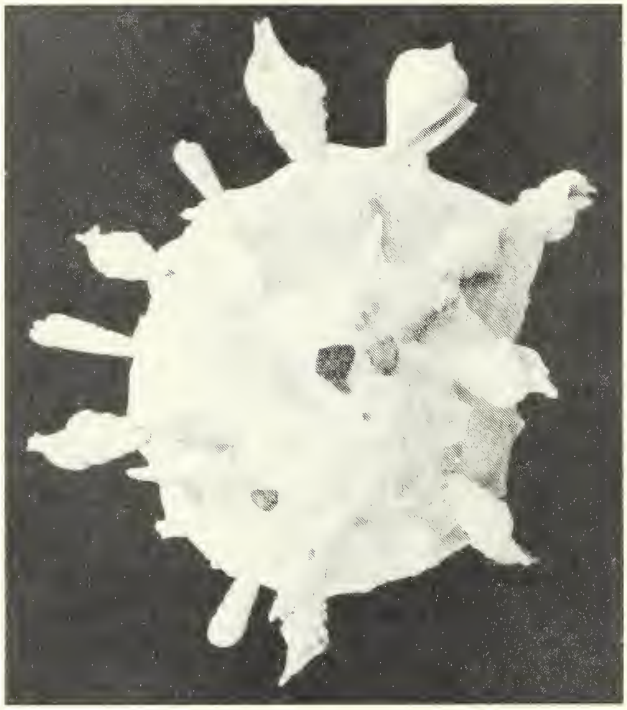


Figure 3. *Xenophora pallidula* (Reeve, 1842), top view. 72 x 40 mm. Location: Philippines. K. Stewart collection.

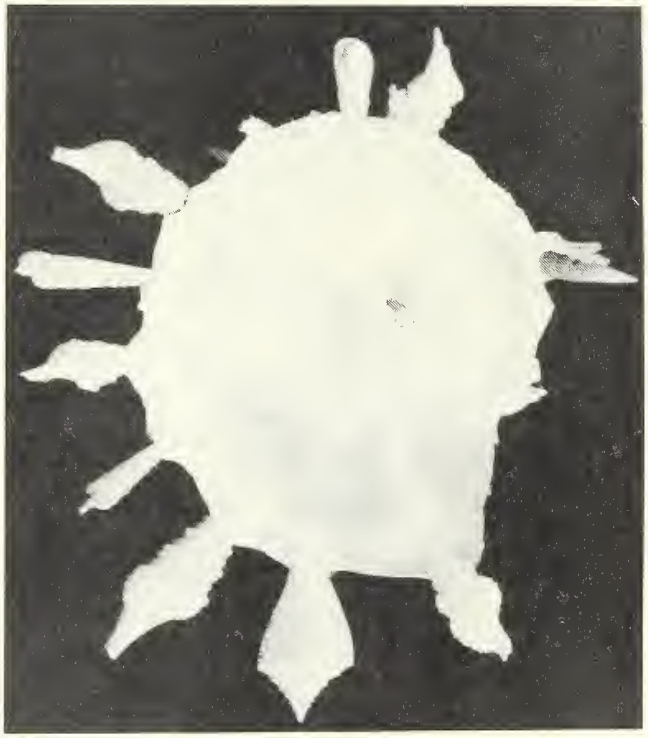


Figure 4. *X. pallidula*, basal view of specimen in Figure 3.

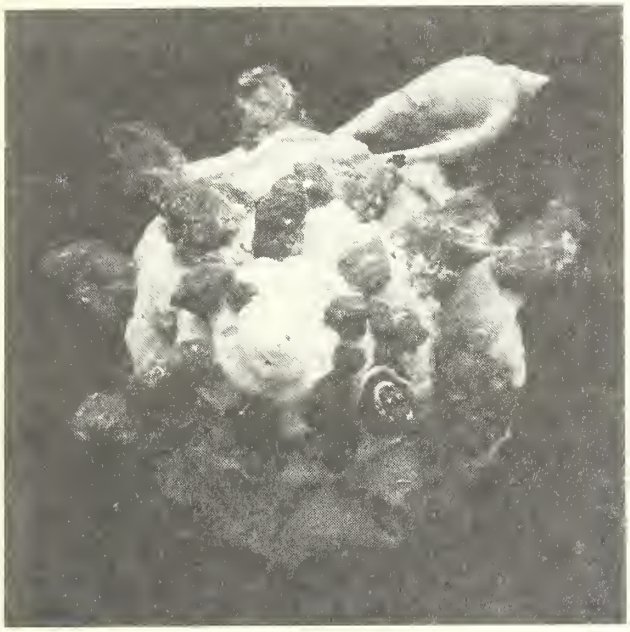


Figure 5. *Xenophora pallidula*, top view. 85 x 40 mm. Location: South Africa. K. Stewart Collection.

Figure 6. *X. pallidula*, basal view of specimen in Figure 5.

Figure 7. *Xenophora pallidula*, lectotype (BMNH 1950.8.28.17), profile view. 51.0 x 71.7 mm. Type locality: Japan.

Figure 8. *X. pallidula*, basal view of lectotype shown in Figure 7. Published with the kind permission of the Trustees of the British Museum (NH).

collabral lines, a whitish color swirled with pale brown. On the dorsum the whorls are slightly convex with sparse, small attachments leaving most of the shell exposed. Several lots have been recorded from the west coast of Madagascar, brought up by trawlers in the Mozambique Channel (Ponder, 1983). One specimen was trawled by a Russian fishing vessel at a depth of 300-350 m (Stewart collection). It is distributed from east Africa through the Indian Ocean, the central Indo-Pacific to northwest Australia and northern New South Wales.

Xenophora solarioides is the smallest of the *Xenophora*. The lectotype (BMNH 1953.4.7.47) (Figures 11 & 12) was from the Philippines. It measures 19.1 mm in diameter and 10.6 mm in height. The shallow spire is densely covered with attachments, the base nearly flat, the umbilicus open with a subangulate border. The basal sculpture varies in the strength of the spiral cords that surround the umbilicus. These are crossed by collabral lines which may be gemmate or smooth. Of fourteen specimens studied, four have attached halves of lightweight bivalves, often as large as the base itself. Others collected small stones or pieces of broken shells. This species is widely spread, from the tropical Indian Ocean through the central Indo-Pacific to the east coast of Australia (Figures 13 & 14). There are two records of *X. solarioides* collected off the east coast of Madagascar

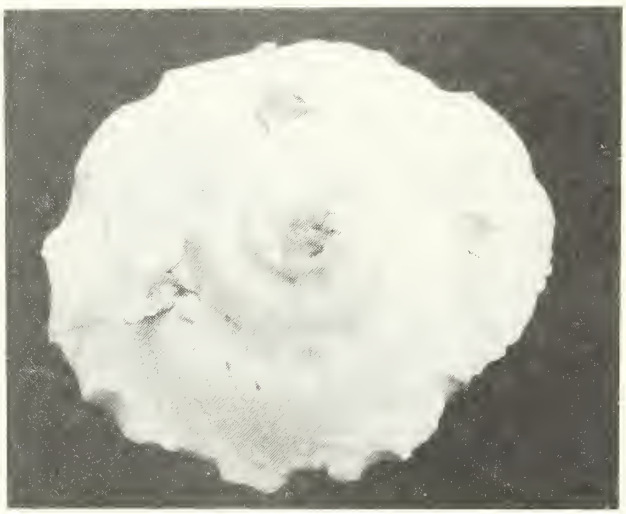


Figure 9. *Xenophora gigantea* Schepman, 1909, top view. 100 x 60 mm. Location: South Africa. K. Stewart collection.

Figure 10. *X. gigantea*, basal view of specimen in Figure 9.

Figure 11. *Xenophora solarioides* Reeve, 1845, profile view of lectotype (BMNH 1953.4.7.47). Type locality: Philippines.

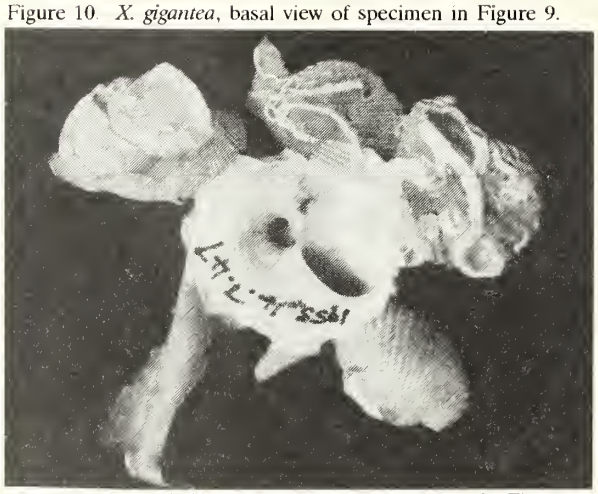


Figure 12. *X. solarioides*, basal view of lectotype in Figure 11. Published with the kind permission of the Trustees of the British Museum (NH).

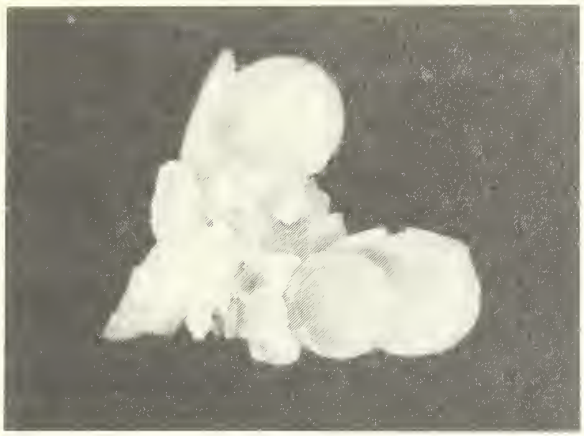


Figure 13. *Xenophora solarioides*, top view. 21 x 8.3 mm. Location: southwest Taiwan. K. Stewart collection.

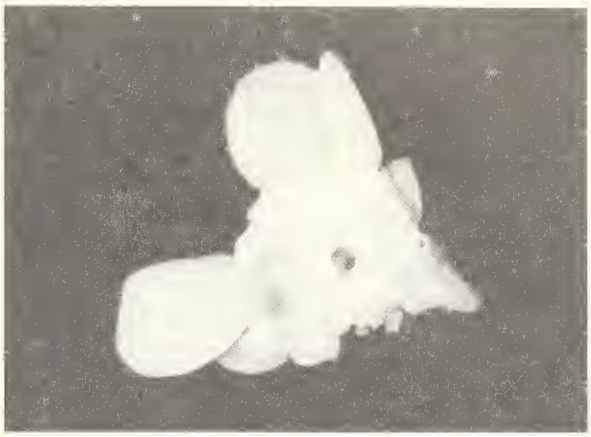


Figure 14. *X. solarioides*, basal view of specimen in Figure 13.

(Ponder, 1983).

Xenophora indica is represented in the Zoological Museum, Copenhagen by three specimens. The type is a small shell with the peripheral flange worn off. It measures 44.7 mm in diameter by 22.5 mm in height. The type locality is Japan. The specimen figured here (Figures 15 & 16) measures 55 mm by 18.2 mm. It was trawled in the Andaman Sea off Thailand. A large specimen may measure to 83 mm.

Xenophora indica has a very thin shell with a wide peripheral flange. The base differs from the other *Xenophora* discussed here. There is a distinct demarcation where the inner base joins the peripheral flange. While the overall color is a light tan, the inner portion of the base may be a darker shade. It has weak collabral lines which are not evident on the porcellaneous skirt. Its shallow spire has foreign material agglutinated only on the first two or three whorls. It is distributed from the

Figure 15. *Xenophora indica* (Gmelin, 1791), top view. 55 x 18.2 mm. Location: Andaman Sea, off Thailand. K. Stewart collection.

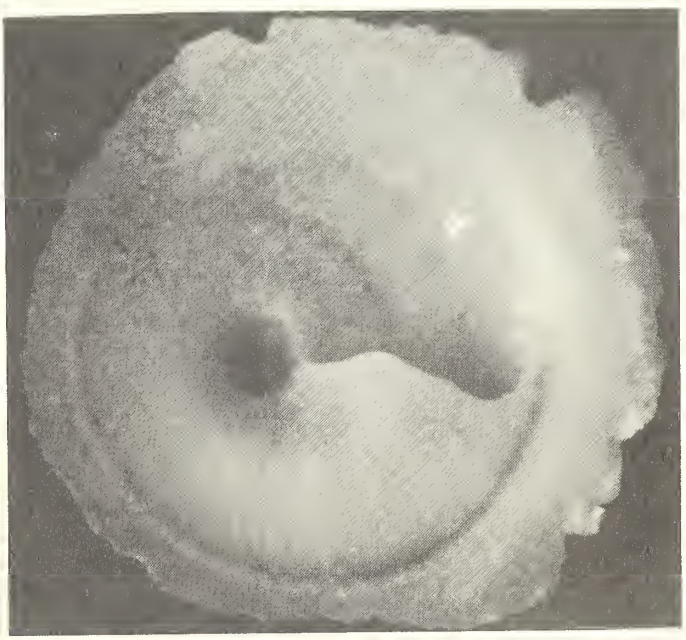
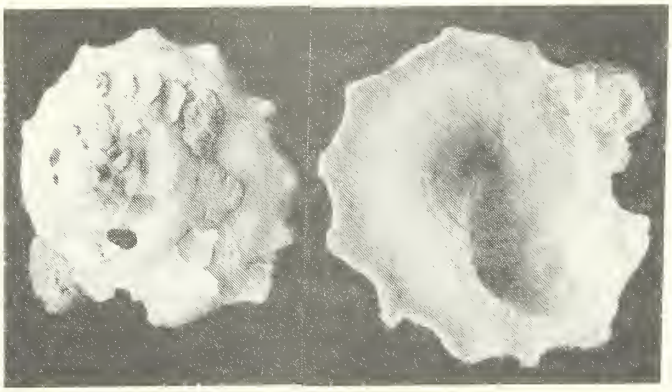


Figure 16. *X. indica*, basal view of specimen in Figure 15.

tropical Indian Ocean through the central Indo-Pacific to the western-most Pacific. In Madagascar it has been collected from the area of Nosy Be in the northwest, with a single record from the southeast (Ponder, 1983).

Southeast Africa has two species of the Xenophoridae, both found in the Mozambique Channel, but not in Madagascar, *X. corrugata* and *X. solaris*. *X. corrugata* (Figures 17 & 18) has been collected from the Persian Gulf, southeast Pakistan, southeast Africa northeast to Zanzibar and Somalia.



Figures 17 & 18. *Xenophora corrugata* (Reeve, 1842). 40 x 25.6 mm. Location: South Africa. K. Stewart collection. (17) top view (18) basal view.

The type (BMNH 1950.8.28.18) (Figure 19) was described from an unknown locality. Zanzibar was designated type locality by Ponder (1983). It measures 62.0 mm in diameter, 40.5 mm in height and has a spire angle of approximately 56 degrees. The whorls are rather convex with generally small attachments., leaving approximately one half of the whitish dorsum exposed. The whitish to brownish base is slightly concave, the sculpture consisting of strong spiral ribs on the inner half, crossed by collabral lines, nodose at the junctures. Two small specimens, 31 and 32 mm, collected by Mr. A. W. White, Advisor to the Office of Fisheries, Khor Fakkan, Sharja, Trucial States, Persian Gulf have closed umbilici, while five specimens, 28-40 mm, trawled from the Tugela Banks off Natal, South Africa, have only partially closed ones. The fragile material which develops a cover over the umbilical area appears to have been damaged in the trawling process. *X. corrugata* has been incorrectly identified as *X. caperata* Philippi, 1855 (Biggs, 1973; Lambiotte, 1979) and as *X. spirata* nom. nud. (St. Jean, pers. comm.). It has been incorrectly identified in photographs in recent publications (Kira, 1959; Habe, 1961; Hinton, 1972; Coleman, 1975; Eisenberg, 1981 and Abbott & Dance, 1982). The name *X. cerea* has often been misused for this species.

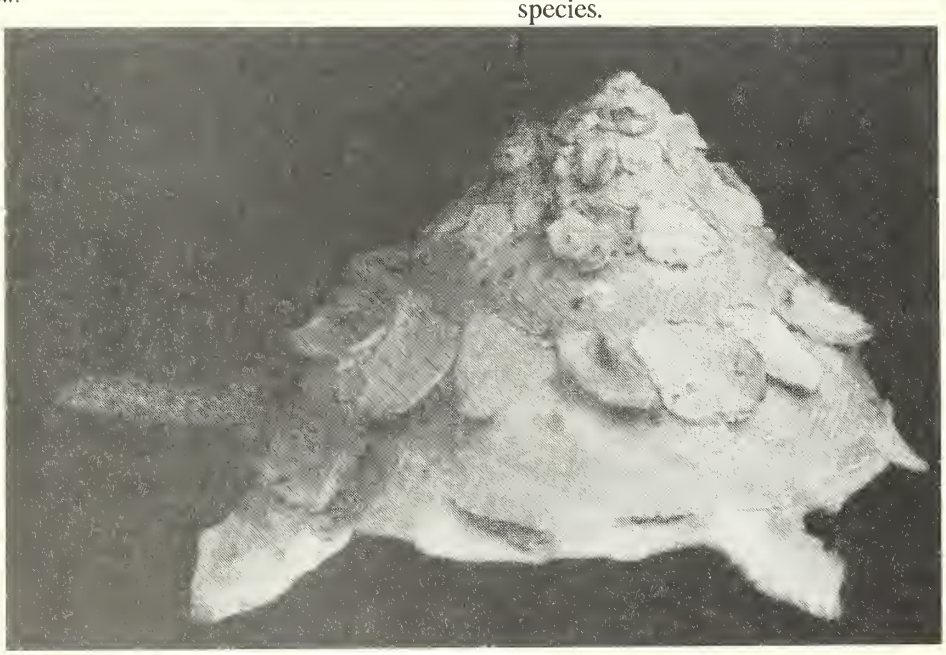


Figure 19. *X. corrugata*, profile view of holotype (BMNH 1950.8.28.18). 40.5 x 62.0 mm. Type locality designated: Zanzibar. Published with the kind permission of the Trustees of the British Museum (NH).

Xenophora solaris is not represented in the Linnaean collection. Ponder (1983) quotes Dodge (1958) as saying that "Linné gave the specimen (possibly his only one) on which his first description (1764) was based to Queen Louisa Ulrica, and that shell is now in the University of Uppsala. This specimen is therefore, regarded as the holotype." The type locality is Java. It has a shallow to moderate spire, with a "peripheral flange represented by 10-20 long, narrow, tubular blunt spines." (Ponder, 1983). The whorls are convex with very few attachments on the first two or three only, the sculpture consisting of fine or, in rare cases, strong opisthocline ribs. The base has strong close collabral lines crossed by spiral ribs rendering them nodose at the intersections. Of the fourteen specimens studied, two from the Tugela Banks off the coast of Natal, southeast Africa, had much stronger dorsal and basal sculpture than those from other areas. Additionally they had thirteen spines as opposed to fifteen or sixteen on the others studied. Based on heavy basal sculpture and fewer spines, this form was described as *Stellaria solaris paucispinosa* Kosuge & Nomoto, 1972. Ponder considers it conspecific with *Xenophora solaris*. The two specimens from Natal have been compared with a paratype in the collection of the California Academy of Sciences, San Francisco (CASIZ 063622) measuring 39 by 72 mm. One of the two specimens is shown in Figures 20 and 21. It was collected at Yemen, Gulf of Aden at 85 meters.

The specimens of the yet undescribed species from Tulear (Figures 1 & 2) share characters with two of the species named above. The basal sculpture is similar to that of *X. corrugata*, but its almost completely covered dorsum and shallow spire separate it from that species. *X. solarioides* has a similarly covered dorsum, but its small size and open umbilicus distinguish it. *X. conchyliophora* (Born, 1780), from Florida, the Caribbean and the west coast of Mexico, also has a covered dorsum, but its base with heavy collabral lines with brown streaks and blotches, and its high spire distinguish it from the Tulear species.

A worn specimen of *X. cerea* (Figures 22 & 23) was collected by the author in three feet of water on a coral reef near the Soanambo cottages on Ile. Ste. Marie off the northeast coast of Madagascar. It is 36.1 mm in diameter and 35 mm in height. The brown base is almost flat, with very strong collabral ridges and a closed umbilicus, characteristic of the species. This find extends the distribution to Madagascar where it has not been previously known. The *X. cerea* type lot (BMNH 1950.8.28.19) consists of four specimens, of which the smallest one is *X. solarioides* (Figures 24 & 25).

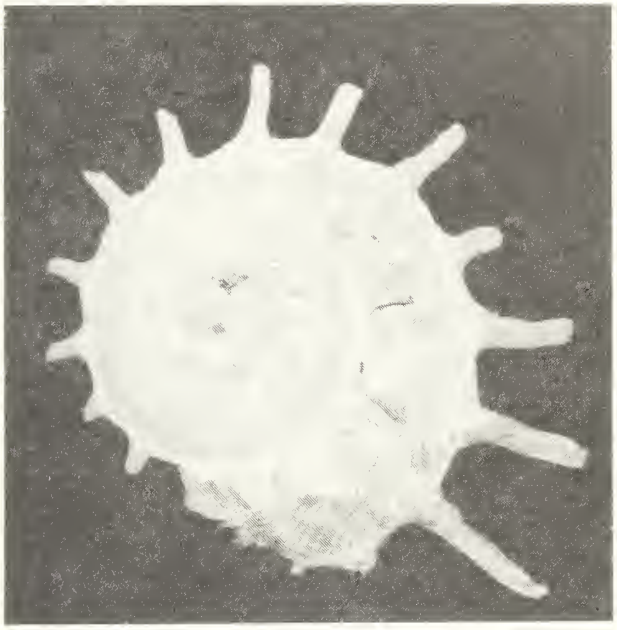


Figure 20. *Stellaria solaris paucispinosa* Kosuge & Nomoto, 1972. Top view. 62.6 x 25.8 mm (without spines). Location: Natal, southeast Africa. K. Stewart collection.

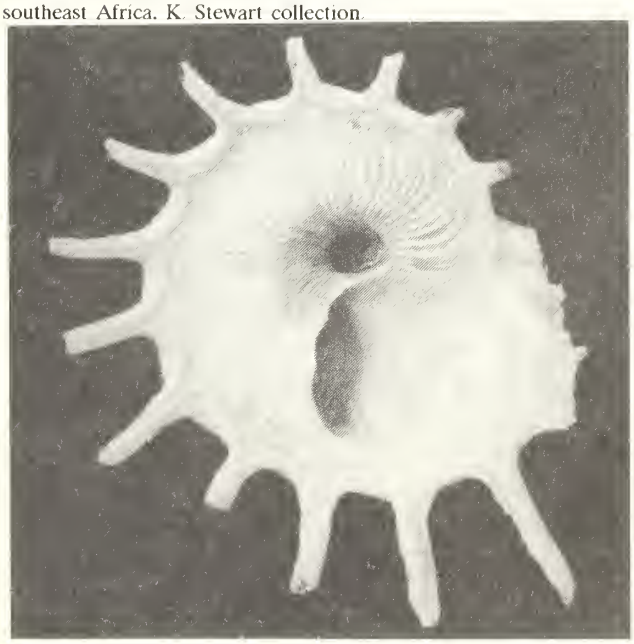


Figure 21. *S. solaris paucispinosa*, basal view of specimen shown in Figure 20.

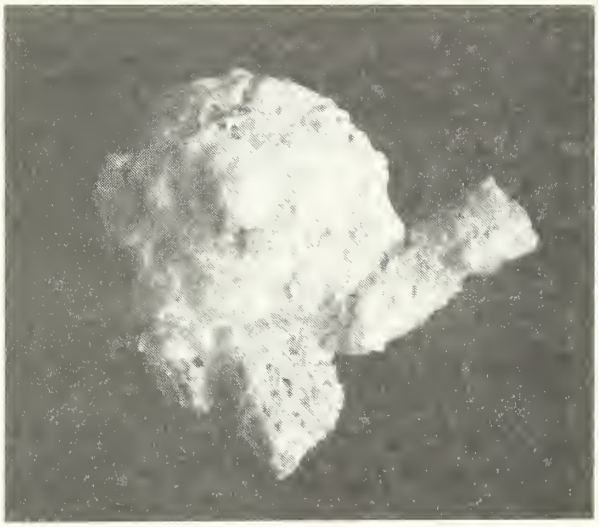


Figure 22. *Xenophora cerea* (Reeve, 1845), top view. 36.1 x 35 mm. Location: Ile Ste. Marie, Madagascar. Leg. K. Stewart, 1990.

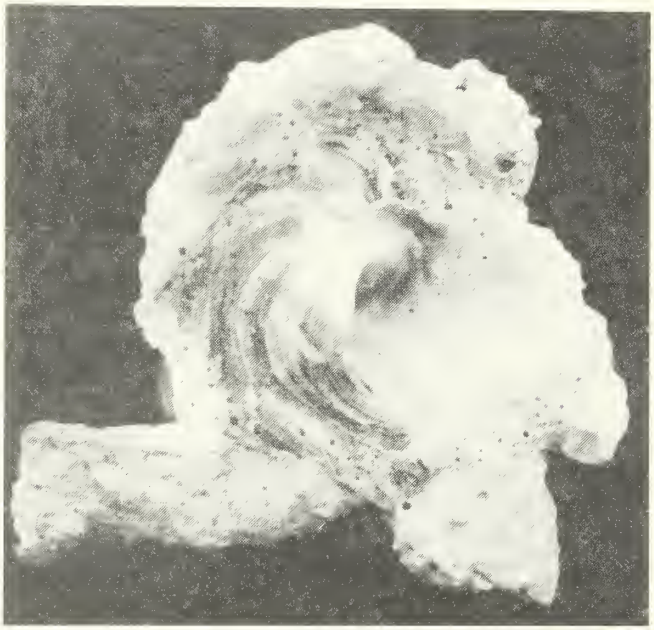


Figure 23. *X. cerea*, basal view of specimen shown in Figure 22. K. Stewart collection.

Figure 24. *X. cerea*, top view of lectotype (top) and two paralectotypes (BMNH 1950.8.28.19). Type locality: Luzon, Philippines. Smallest specimen is *X. solarioides*.

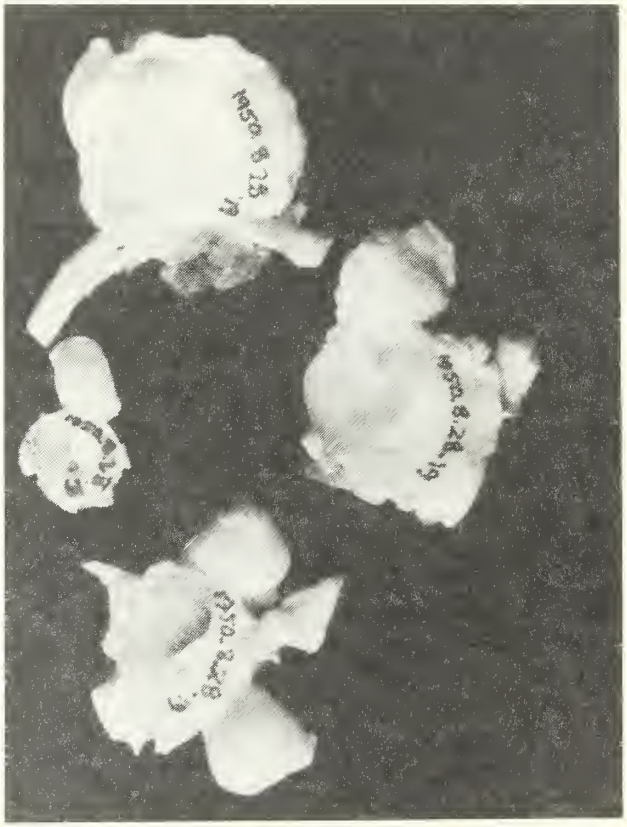


Figure 25. *X. cerea*, basal view of type lot shown in Figure 24. Published with the kind permission of the British Museum (NH).

X. cerea is a wide-ranging species found from tropical east Africa, islands of the western Indian Ocean (Mauritius and the Seychelles), tropical Indo-Pacific, as well as eastern Australia and Japan. The island of Luzon, Philippines is the type locality. A chocolate brown variety (Figures 26 & 27) has been described as *X. torrida* Kuroda & Ito, 1961. It grades into the typical color form and cannot be otherwise distinguished. Ponder (1983) considers it conspecific with *X. cerea*. The dorsum carries pebbles, at times coral. Most often this sturdy shell is 1/4 to 1/3 covered, the base almost flat and is sculptured with heavy collabral lines. In some specimens subspiral lines cross these cords, rendering them gemmate at the points of intersection.

Figure 26. *Xenophora cerea* var. *torrida* (Kuroda & Ito, 1961), top view. Location: Japan. K. Stewart collection.

Figure 27. *X. cerea* var. *torrida*, basal view of specimen shown in Figure 26.

ACKNOWLEDGMENTS

My heartfelt thanks to Kate St. Jean for her long and assiduous study of the Xenophoridae, and for so generously sharing her knowledge and her specimens. Ms. Kathie Way of the Natural History Museum, London, sent the Reeve types (and notes) to the Los Angeles County Museum of Natural History, where Dr. James H. McLean kindly made them available for study. Mr. Gene Mallory photographed them. They are published with the kind permission of the Trustees of the BMNH. Dr. Winston Ponder suggested that a note be made of the range extension of *X. cerea*. The California Academy of Sciences, San Francisco, made its collection available for study and Dr. Terrence Gosliner of that institution reviewed this article. I am most grateful for their help.

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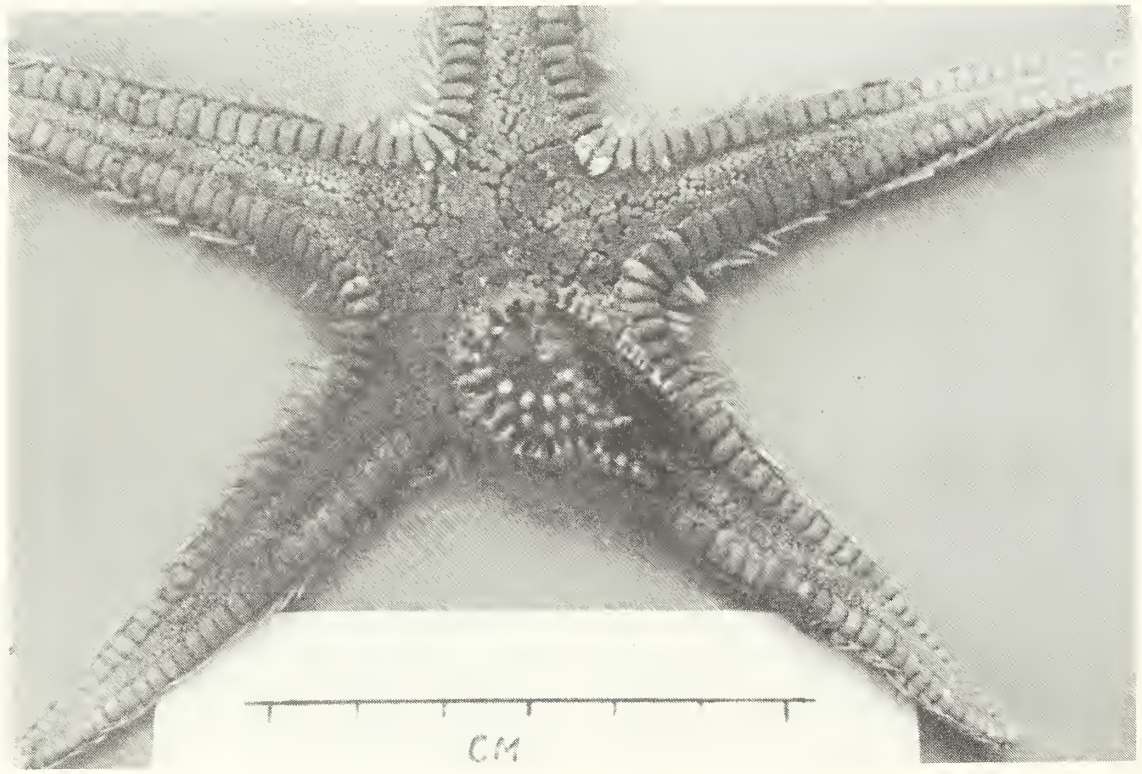
HAVE YOU EVER HAD THE FEELING THAT IF YOU ATE ANOTHER THING YOU'D BURST?

DON PISOR

10373 El Honcho Place, San Diego, California 92124



This specimen of *Astropecten armatus* Gray, 1840, with *Conus californicus* Reeve, 1844, embedded in its dorsum was in the collection of Helmut Meier of Escondido, California. This sea star species is found off the California coast. The specimen is now in the Pisor collection.

SOLEN (ENSISOLEN) GEMMELLI COSEL, 1992

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In the 1987 annotated catalogue on the bivalves of the San Felipe area from the Gemmell Collection, Gemmell, Myers & Hertz, listed, in addition to *Solen pfeifferi* Dunker, 1862, two *Solen* species as "new species A" and " new species B" (p. 57) . At the time of our work on the 1987 catalogue, the Gemmell *Solen* material along with type material from the San Diego Natural History Museum had been sent to Dr. Rudo von Cosel of the Muséum National d'Histoire Naturelle, Paris, for his work on the Solenidae. Now in his 1992 paper in **The Veliger**, Dr. Cosel has identified our "species B" as *Solen (Ensisolen) rostriformis* Dunker, 1862, and described our "species A" as the new species *Solen (Ensisolen) gemmelli* (Figures 1 & 2) which he named in honor of Joyce Gemmell. This updates the identification of the three *Solen* species collected by Gemmell in the San Felipe area.

Our appreciation to David K. Mulliner for the photographs of "species A", now the holotype of *S. (E.) gemmelli*, taken at the time of the annotated catalogue.

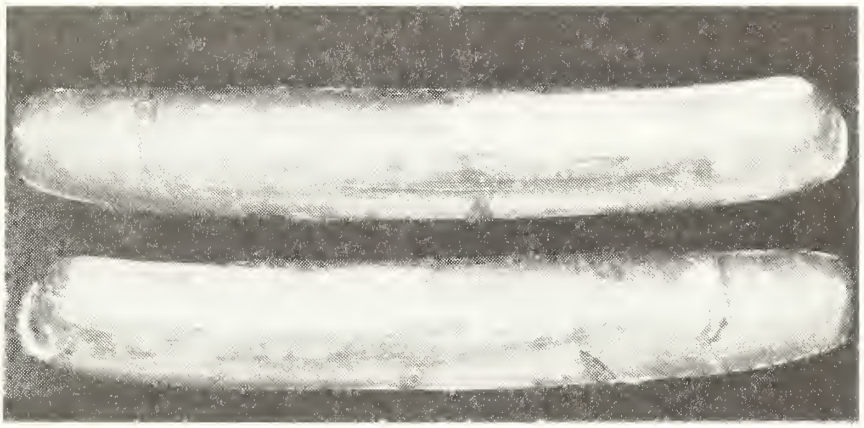

Figure 1. *Solen (Ensisolen) gemmelli* Cosel, 1992. Holotype, SDNHM 90139, exterior of valves. Type locality: San Felipe area between Playa Alicia and El Paraíso, on sandbars at low tide mark. Leg. Joyce Gemmell.
Photo: David K. Mulliner.

Figure 2. *S. (E.) gemmelli*, interior of valves of holotype.
Photo: David K. Mulliner.

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THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Fossil and Recent Cypraeacea of the Eastern Pacific

Lindsey T. Groves of the Natural History Museum of Los Angeles County will discuss the cowries, past and present, of the eastern Pacific. His talk will be illustrated with slides.

Shells of the month: Cowries, fossil and Recent

Meeting date: February 18th

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - January 21, 1992

President Carole Hertz called the meeting to order at 7:45 PM. Dates for Club events and committee chairs for 1993 were announced (see below) and Wes Farmer volunteered to serve as the Club's Botanical Garden Foundation Representative. Jules Hertz shared new publications received for the library noting that a new muricid was described honoring member Carol Skoglund.

Terry Arnold introduced the evening's speaker, Dr. Kent Trego whose topic was "Shell Variation and Species Determination in the Genus *Nautilus*." He discussed the many named forms of *Nautilus* including the "questionable" ones and provided some pointers for differentiating the various species and forms. The talk was illustrated with slides of the generally recognized species and several forms of *Nautilus* as well as several species of *Argonauta*.

Following the talk the shell drawing was won by Terry Arnold. Members and guests then shared a social time with refreshments provided by the Mulliners and Hutsells.

Mark your Calendars

The following Club events for 1993 have already been scheduled. Please mark your calendars so you won't miss them.

Club auction and potluck--April 24th
Bizarre Bazaar--May 15th
September party--September 18th
Christmas party--December 4th

Committee Chairs for 1993

Hospitality: Bill Romer
Telephone: Paula Barton, Tommy Thomas
Historian: Linda Hutsell
Library: Margaret Mulliner & Pat Boyd
Publicity: Larry Buck
Botanical Foundation Rep.: Wes Farmer
Marine Field Study: Terry Arnold

The Club still needs a member of the phone committee to help in calling central San Diego. If you can help, please call Carole Hertz (277-6259).

A Request from the Club Library

The Club library circulates its material for one month. Members are requested to return books at the next regular meeting following their loan. Since some of the books are in considerable demand, please notify the librarian should a problem arise in returning a book.

The Shells for Schools Project

Volunteers are needed for the Shells for Schools project. The Club has discussed preparing kits with shells and printed information to present to local schools. Contact Kim Hutsell (232-2842).

The Auction/Potluck

It's time to think about the 1993 Auction/Potluck. Please look into your collections now and prepare your donations for this important and exciting Club function. Specimen quality shells, with good collecting data, when possible, are needed. Bring your shells to the February meeting or contact a board member and arrange for their pickup.

This is the Club's primary fundraiser and its proceeds provide support for **The Festivus**, Club library and donations to scientific organizations and social events. We urge you all, both out of town and local to be generous and donate to the auction.

1993 Gem Diego Show

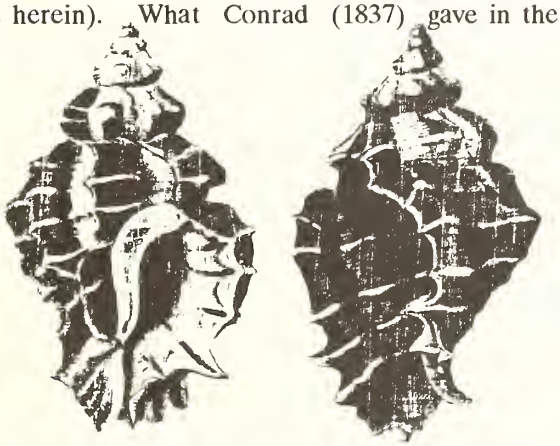
The San Diego Mineral & Gem Society's annual show at the Scottish Rite Temple in Mission Valley will be Mar. 20 (10 AM - 6 PM) and Mar. 21 (10 AM - 5 PM). There will be numerous special displays of minerals, fossils and gems as well as about 20 dealers.

CERATOSTOMA MONOCEROS (SOWERBY, 1841) A POORLY KNOWN MURICID FROM THE EASTERN PACIFIC

CAROLE M. HERTZ

San Diego Natural History Museum, P.O. Box 1390,
San Diego, California 92122

The species *Ceratostoma monoceros* (Sowerby, 1841a) has been variously considered a form of *C. nuttalli* Conrad, 1837 (Eisenberg, 1981:91; Radwin & D'Attilio, 1976:114), and as a distinct species (Vokes, 1988:40; Morris, Abbott & Haderlie, 1980:276; Fair, 1976:60; Keen, 1971:534; Hall, 1959:429). In many popular books the species does not appear at all. *Ceratostoma monoceros*, described by Sowerby without locality, was well illustrated in the CONCHOLOGICAL ILLUSTRATIONS (pl. 188, figs. 64, 65) (Figures 1 & 2 herein). What Conrad (1837) gave in the original description of *C. nuttalli* (pl. 20, fig. 22) is the banded form shown here in Figure 3. Specimens of *Ceratostoma* in the Los Angeles County Museum of Natural History (LACM), San Diego Natural History Museum (SDNHM), and Hertz collections exhibit several consistent characters, which are distinct from *C. nuttalli* although the geographical distribution of the two species overlaps.



Figures 1 & 2. *Ceratostoma monoceros* (Sowerby, 1841a). After Sowerby (1841b, pl. 188, figs. 64, 65).

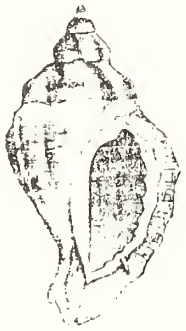
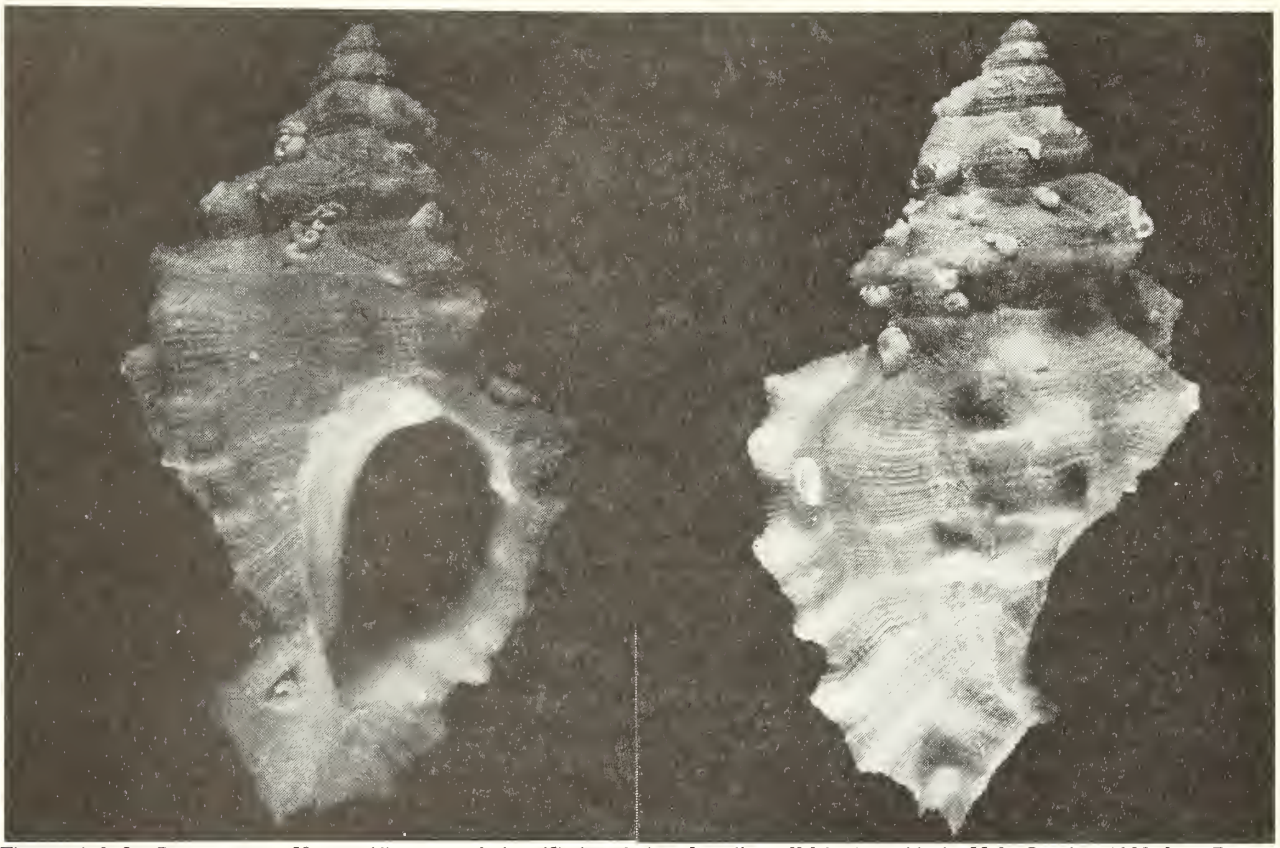


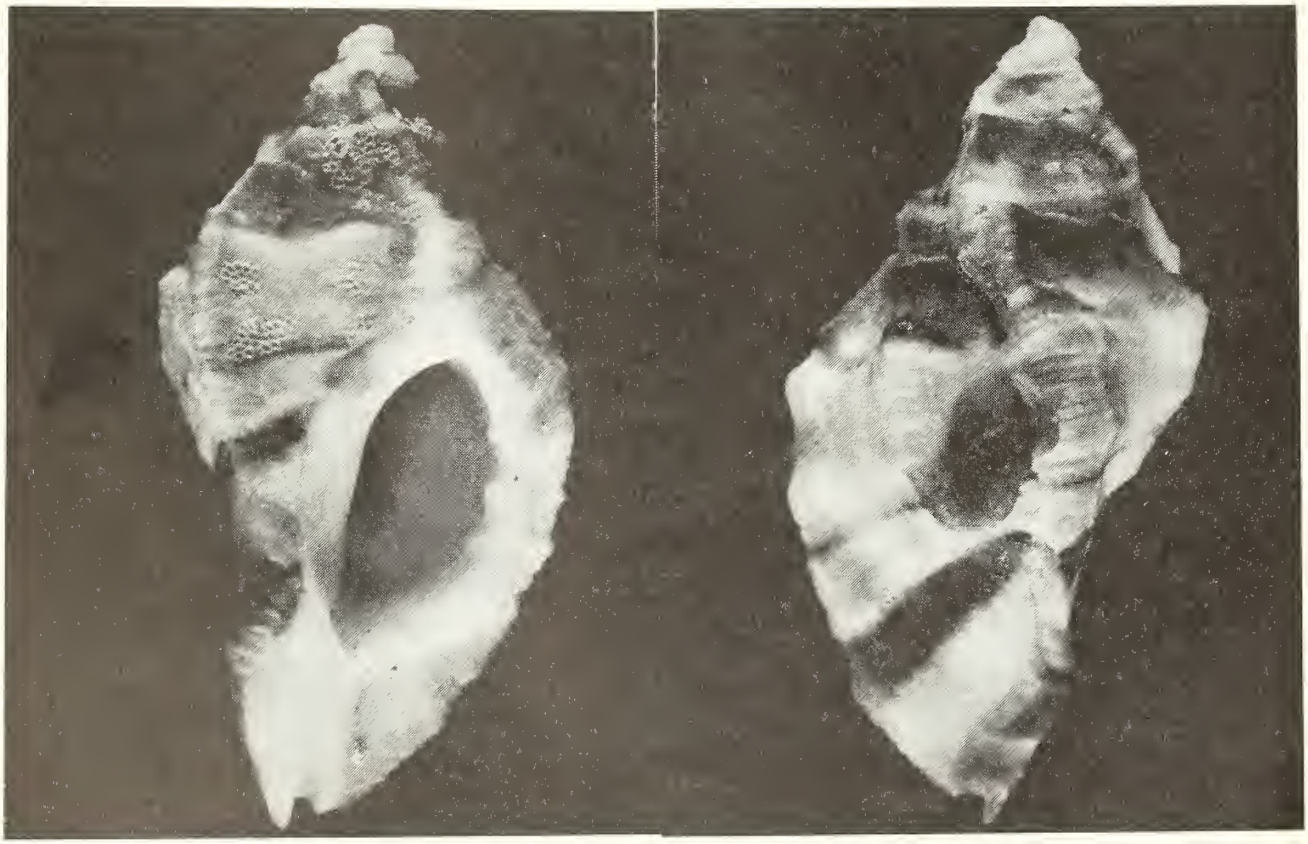
Figure 3. *Ceratostoma nuttalli* Conrad, 1837. After Conrad (1837, pl. 20, fig. 22).

Ceratostoma monoceros (Figures 4 & 5), a larger species, attains a length of 65 mm (Fair, 1976) but *C. nuttalli* (Figures 6 & 7) rarely exceeds 50 mm (although a world record specimen is recorded at 64.3 mm (Draper, 1987). *Ceratostoma monoceros* with a grayish-tan shell, has rounded varices lacking the varical flanges (sometimes highly foliated) of *C. nuttalli* and consistently bears raised scabrous threads over the entire shell surface; *C. nuttalli* varies in color from brown to banded brown and white to all white, and is relatively smooth. In *C. monoceros* the spire is somewhat higher and is more shouldered than in *C. nuttalli* (Hall, 1959:429, text fig. 1) and the sutures are distinct and moderately regular, clearly delineating the whorls. In *C. nuttalli* the sutures are irregular and rise to the previous whorl at the aperture.

Specimens of *C. monoceros* studied were found on the Pacific coast of Baja California, México, from one mile north of the east side of Isla Cedros (SDNHM 22976 [1 specimen in mixed lot], LACM 71-92) south to Bahía Asunción and to Bahía Magdalena (SDNHM 22978) (with one lot of one



Figures 4 & 5. *C. monoceros*, 58 mm. (4) apertural view (5) dorsal view. Locality: off Isla Asunción in 55 ft, October 1982. Leg. Ron H. McPeak. Photos: D.K. Mulliner.



Figures 6 & 7. *C. nuttalli*, 38 mm. (6) apertural view (7) dorsal view. Locality: South Casa Beach, La Jolla, California, intertidal, March 1964. Leg. David K. Mulliner. Photos: D.K. Mulliner.

26.5 mm specimen from the Golfo de California at Punta Willard, San Luis Gonzaga (LACM 37-119 *ex* AHF 716-37). *Ceratostoma nuttalli* was found to have a much greater distribution, with specimens from Mendocino County (SDNHM 89502) down the coast of California to Baja California, Mexico, from Isla Guadalupe (LACM 65-39, SDNHM 82207) to Isla Cedros (SDNHM 22980, SDNHM 22976 [mixed lot, 1 specimen]), and south to Bahía Asunción (SDNHM 82351) and Bahía Magdalena (SDNHM 46205). Two juvenile specimens (SDNHM 82993 [*ex* Morris Levine Collection]) are listed from Puget Sound, Vancouver Is., Canada. During a visit to Bahía Asunción in 1982 (Hertz & Hertz, 1984) specimens of *C. monoceros* were collected by David K. Mulliner and Ron H. McPeak diving in 55-70 feet off Isla Asunción (Hertz collection) and one intertidal specimen of *C. nuttalli* was collected by Jules Hertz (Hertz collection). The following year, in May, Ron McPeak collected a lot of 18 extremely encrusted specimens of *C. nuttalli* at Bahía Asunción (SDNHM 82351). While *C. nuttalli* is more common in the Californian Province and *C. monoceros* seems to have a restricted distribution from Isla Cedros to Bahía Magadalena, both have been found near Isla Cedros, at Bahía Asunción and Bahía Magdalena. Dr. Emily Vokes (personal communication) noted that she has Pleistocene specimens of *C. monoceros* from the Upper San Pedro Series, San Pedro, California, "suggesting a temperature determined species."

ACKNOWLEDGMENTS

I thank James H. McLean and Lindsey T. Groves for making comparative material in the Los Angeles County Museum of Natural History collection available to me for study. The San Diego Natural History Museum made the facilities in the library and Department of Marine Invertebrates available to me which I appreciate. My gratitude to Emily H. Vokes who kindly reviewed the paper and gave additional information and to David K. Mulliner who took the fine photographs.

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BOOK NEWS

PACIFIC COAST NUDIBRANCHS: SUPPLEMENT I. RADULA
By: David W. Behrens. 1992.
Publisher: Sea Challengers, 4 Somerset Rise, Monterey, CA 93940. 11 pp., 150 illustrations.
Price: $6.95 (add California tax 7.25%; shipping/handling $1.80).

A marvelous little book just arrived in my office: the supplement to Dave Behrens' **Pacific Coast Nudibranchs, second edition** (1991). It consists of line drawings of the radular teeth of 150 opisthobranch species that occur on our Pacific coast from Alaska to Baja California. The cover is a beautiful scanning electron micrograph of the radula of *Bajaeolis bertschi*, an especially foudroyant hydroid-eating eolid nudibranch.

The introduction summarizes the taxonomic uses of radulae, their overall structure and function, and how to extract and mount a radula for study.

When I received this booklet, I spent a lot of time perusing the drawings, thinking about the different shapes, the species' prey items, and reasons for differences and similarities. For instance, the sponge-feeding notaspidean *Anidolyta spongotheras* has radular teeth similar to those of the sponge-feeding nudibranch species of *Cadlina* and other chromodorids, yet is distinctly different form the sponge-feeding teeth of species of *Aldisa*. The old adage, "You are what you eat," can be appropriately paraphrased according to evolutionary principles, "Your teeth shapes are adapted to what you eat."

This publication highlights the diversity of opisthobranch feeding structures and should encourage much thought and study about their functional morphology. If you are interested in the biology of mollusks, this little book offers much food for thought. It is highly recommended.

Hans Bertsch

1993 LOW TIDES FOR THE NORTHERN GULF OF CALIFORNIA

The entries listed below show only periods of low tides of -4.0 feet and below. The times of low tides are given in Mountain Standard Time. To correct for San Felipe, subtract one hour from listed times which are for Puerto Peñasco (San Felipe is on Pacific Standard Time). Tides below the midriff of the Gulf cannot be estimated using these entries.

February
4. -4.0 at 6:20 PM
5. -5.5 at 7:00 PM
6. -6.0 at 7:30 PM
7. -4.0 at 8:30 AM
-6.0 at 8:30 PM
8. -4.3 at 9:00 AM
-5.2 at 9:00 PM
9. -4.0 at 9:40 AM

March
6. -5.2 at 7:00 PM
7. -4.0 at 7:15 AM
-6.0 at 7:30 PM
8. -5.2 at 8:00 AM
-6.0 at 8:00 PM
9. -6.0 at 8:40 AM
-4.3 at 8:50 PM
10. -5.5 at 9:00 AM
11. -4.2 at 9:45 AM

April
5. -4.6 at 7:00 AM
-4.2 at 7:15 PM
6. -5.8 at 7:30 AM
-4.0 at 8:00 PM
7. -6.0 at 8:00 AM
8. -5.7 at 8:45 AM
9. -4.2 at 9:30 AM

May
4. -4.4 at 6:15 AM
5. -5.6 at 6:30 AM
6. -5.9 at 7:30 AM
7. -5.0 at 8:15 AM

June
3. -4.2 at 7:00 AM
4. -4.3 at 7:40 AM
5. -4.0 at 8:15 AM

July
19. -4.2 at 7:45 AM
20. -4.2 at 8:30 AM
31. -4.2 at 9:00 AM

August
17. -4.2 at 7:30 AM
18. -4.4 at 8:00 AM
19. -4.0 at 8:30 AM

September
15. -4.2 at 7:10 PM
-4.0 at 7:30 PM
16. -4.2 at 7:50 PM
-4.2 at 8:00 PM
17. -4.1 at 8:45 PM

October
13. -4.0 at 6:15 PM
14. -5.0 at 7:00 PM
15. -5.8 at 7:30 PM
16. -5.2 at 8:00 PM
17. -4.0 at 9:00 PM

November
11. -4.0 at 6:00 PM
12. -5.3 at 6:30 PM
13. -5.7 at 7:15 PM
14. -5.3 at 8:15 PM
15. -4.2 at 8:30 PM

December
11. -4.4 at 6:40 PM
12. -5.0 at 7:10 PM
13. -4.7 at 8:00 PM
14. -4.2 at 8:30 PM
28. -4.0 at 7:30 PM
29. -4.1 at 8:00 PM
30. -4.0 at 8:30 PM

CONUS MAHOGANI (REEVE, 1843) THE FIRST SPECIMEN FROM COCOS ISLAND, COSTA RICA

KIM C. HUTSELL

5720 Gaines Street #23, San Diego, California 92110

In April 1992 I had the opportunity to join a scientific expedition to Cocos Island, Costa Rica. My role in the expedition was to videotape the various techniques that would be employed, both above and below water, for collecting marine specimens of that area. Aside from my filming duties, I was able to do some diving and exploring on my own.

Near the end of the trip we anchored in Wafer Bay and I went in the water for a night dive under the boat. While checking trails in the sand at about 17 meters (56 ft), I discovered a live specimen of *Conus mahogani* (Reeve, 1843) (Figures 1-2). Because I had collected this species in many locations throughout the Gulf of California, Mexico (where it is relatively common), I didn't think this particular specimen would be of great interest, but I brought it aboard anyway.

As standard procedure, everything collected during each dive was submitted to Henry Chaney, Don Shasky, or Michel Montoya for a determination on whether a specimen should be retained for study or returned to the water. To my surprise, I was informed that my find was the first specimen that had ever been observed either live or dead at Cocos. The known range of *C. mahogani* is from the upper Gulf of California to Ecuador and the Galápagos (Hanna, 1963; Chaney, 1987). This find gave a considerable extension to its distribution since Cocos Island is some three hundred miles from the mainland. The specimen measures 33.59 mm in length and 14.52 mm in width. It is now part of the wet collection at the Santa Barbara Museum of Natural History (SBMNH 53145).

I feel fortunate that by merely being an extra pair of eyes and hands, I was able to make a small, but significant contribution to the expedition and the science of malacology.

Figure 1. *Conus mahogani* (Reeve, 1843). Taken on SCUBA, collected live in sand trail at 17 m (56 ft) at night, Wafer Bay, Cocos Island, Costa Rica, April 6, 1992. Leg. K. Hutsell. Photo: D.K. Mulliner.

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THE FESTIVUS

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Volume: XXV | March 11, 1993 | Number: 3

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Specializing

Club member Kim Hutsell will give an illustrated program discussing how and why people specialize and the kinds of specialization i.e. families, localities. He will also have a display.

Shells of the month: Jewel Box Clams (Chamidae)
Meeting date: March 18th

CONTENTS

CLUB NEWS

Special Door Prize at the March Meeting

For those in attendance at the March meeting, there will be a separate and special door prize which has been given by an anonymous donor. Remember--you have to be at the meeting to win!!

From the Minutes - San Diego Shell Club Meeting - January 21, 1992

The meeting was called to order by President Carole Hertz at 7:40 PM. After welcoming members and introducing guests, the minutes of the January meeting were accepted as read.

Carole announced that member Twila Bratcher had been gravely injured in a fall on her front steps and was currently in the hospital. It is hoped that she will return home this month to continue her recovery.

The Auction/Potluck will be on 17 April in the recreation room at Wes Farmer's condo. A signup sheet for the potluck will be passed at the March meeting. Members are requested to bring their shell donations to the March meeting or contact a board member to arrange for pickup.

The Club will participate in the WSM Scholarship Fund in the amount of $200. and will host a wine and cheese reception preceding the WSM auction.

Jules Hertz shared the latest issues of publications received by the Club library following which Vice President Hugh Bradner introduced Lindsey Groves of the Los Angeles County Museum of Natural History, who spoke on "Fossil and Recent Cypraeacea of the Eastern Pacific", the subject of his current research. The presentation was illustrated with slides of all the currently described species of Cypraeacea from the eastern Pacific. Most of the fossil specimens illustrated were holotypes. Several newly described fossil species were illustrated and three undescribed specimens currently being studied were also shown. Several of the species had not previously been photographed. Lindsey gave a complete account of his research and his very well-planned program was greatly enjoyed by all.

The door prize was won by Marge Bradner. A social time, with refreshements provided by Larry Buck, Rick Negus and Bill Romer, followed.

Terry Arnold

Additions to the Roster

Bertsch, Hans, 4034 S. Pacific Ave. #21, San Pedro, CA 90731. (213) 833-8225.

Bishop, John, 3026 Freeman, San Diego, CA 92106. (619) 223-6038.

Hawaiian Malacological Society, P.O. Box 22130, Honolulu, HI 96822.

Herrmann, Richard & Ginny, 12545 Mustang Dr., Poway, CA 92064. (619) 679-7017.

Novak, Carole, 4433 Vista de La Tierra, Del Mar, CA 92014. (619) 481-3301.

Smithsonian Institution Libraries, Acct.#9010520201, Washington, DC 20560.

Scripps Institution of Oceanography, C-075-C, University of California, La Jolla, CA 92093.

Steinke, Dale & Christy, 12100 Tall Trees Dr., Dunlap, IL 61525.

Wuyts, Jean, 82 Koningsarendlaan, 2100 Deurne 4, Antwerp 22, Belgium.

The Auction/Potluck on April 17th

Saturday evening, April 17th is the Club's annual Auction/Potluck--the year's biggest social event and fundraiser. The Auction will again be held at the Clubhouse of Wes Farmer's condo complex (**The Festivus** issue in April will include a map) and the festivities will begin at 6:00 PM.

Your quality shells are much needed to make this auction a success. Several beautiful *Cypraea* species have already been donated--*C. rosselli, C. venusta* and a 90 mm *C. friendii*, but YOUR shells are also very important to the success of the auction. Remember that besides being the favorite event of the year, the auction proceeds support **The Festivus**, student awards, donations to scientific publications--and social events. Please be generous with your donations--and come to the auction!

THE COLLECTION AND OBSERVATION OF LIVING *MORUM VELEROAE* FROM COCOS ISLAND, COSTA RICA

HENRY W. CHANEY

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105

While the April 1992 visit to Cocos Island was successful at adding new records to the ongoing survey of the island's marine mollusks (Chaney, 1992), an acknowledged highlight of the trip was the taking of living specimens of the rarely seen and very beautiful *Morum veleroae* Emerson, 1968.

Although a living specimen had been discovered during a past trip to Cocos Island (Shasky, 1989), the 1992 expedition was the first to take specimens in numbers significant enough for comparative observations of the living animal, its shell morphology, growth characteristics, and the nature of its deep water habitat. In fact the number of known specimens was more than doubled as a result of this excursion.

Past Collection History and Systematic Treatment

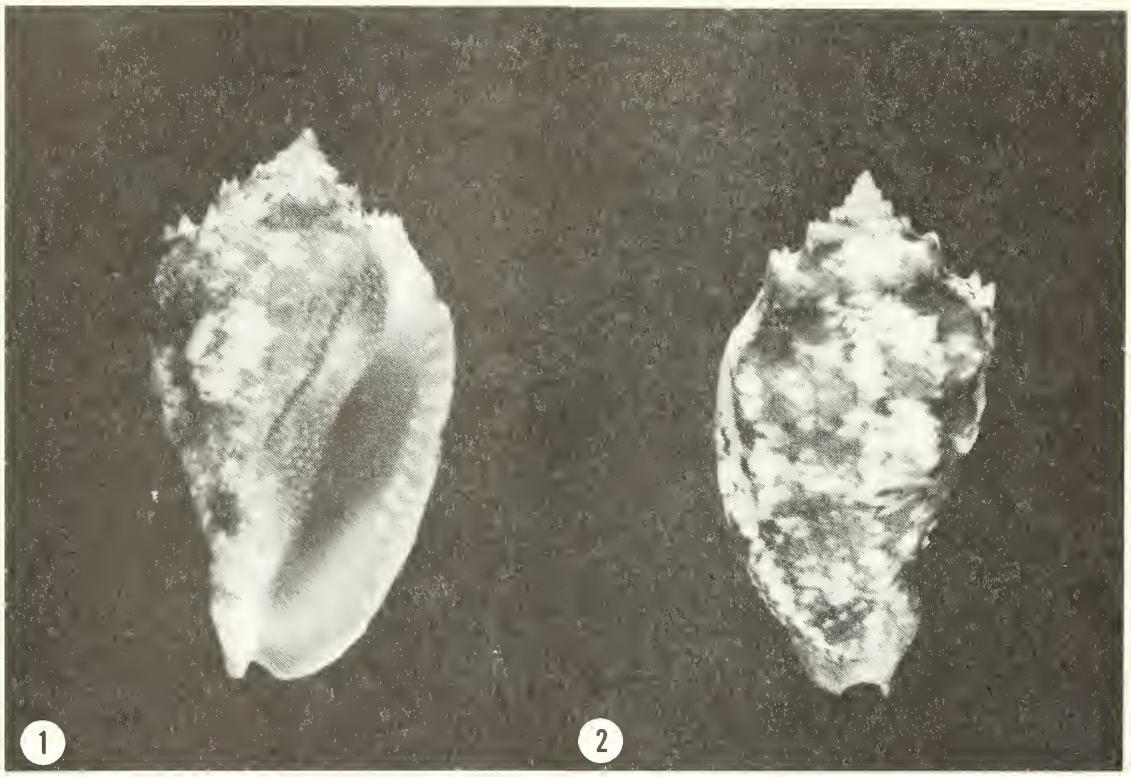
Emerson (1968) described *Morum veleroae* from specimens collected during the 1938 Hancock Pacific Expedition to Cocos Island, naming the species after the **Velero III**, one of the vessels used by Capt. G. Allan Hancock during his explorations of the Eastern Pacific. The type locality is Chatham Bay situated on the north side of Cocos Island. Besides the holotype (LACM 1170), four paratypes were designated of which three remained with the holotype and one was deposited in the American Museum of Natural History in New York City (AMNH 138280). All of the type specimens are either subadult or juvenile. In 1968 four specimens were dredged by Jacqueline DeRoy and Carmen Angermeyer from three localities in the Galápagos Islands, thus extending the range. Among these specimens was the first known mature adult, subsequently figured by Emerson (1969).

Collections of additional specimens were not recorded until Shasky reported the discovery of a live adult (41.65 mm) in a tangle net during his March 1989 expedition, which also included collection of several dead specimens. Tangle nets used in 1991 and 1992 also collected dead specimens and fragments, but live specimens were not found until a dredge was used in early April 1992.

Morum (Oniscidia) veleroae is one of two known species of the genus extant in the Eastern Pacific (Figures 1-2). The other taxon, *Morum (Morum) tuberculosum* (Reeve, 1842), is commonly found in the shallow nearshore habitats throughout the Panamic Province, including the Galápagos Islands (Emerson & Old, 1963), but so far it has not yet been reported from Cocos Island. This species is similar to some forms of *Morum (M.) oniscus* (Linnaeus, 1767) which occurs in Bermuda, the Caribbean basin and along the Atlantic coast to Brazil. In addition there are 15 extant species of *Morum (sensu lato)* currently recognized from the Indo-west Pacific biogeographic region (Emerson, 1990) and *M. (M.) matthewsi* Emerson, 1967 is known from Brazil, largely taken from the digestive tracts of bottom feeding fish.

In contrast, *Morum veleroae* has thus far been found in the eastern Pacific only at Cocos Island and the Galápagos Islands. It bears general resemblance to *Morum (O.) dennisoni* (Reeve, 1842) (Figure 3), and the more recently described *Morum (O.) lindae* Petuch, 1987 (Figure 4), both of which occur in the Caribbean.

Emerson (1968) separated *M. veleroae* from the



Figures 1 & 2. *Morum veleroae* Emerson, 1968. Adult male, 39.15 mm, SBMNH 53149.

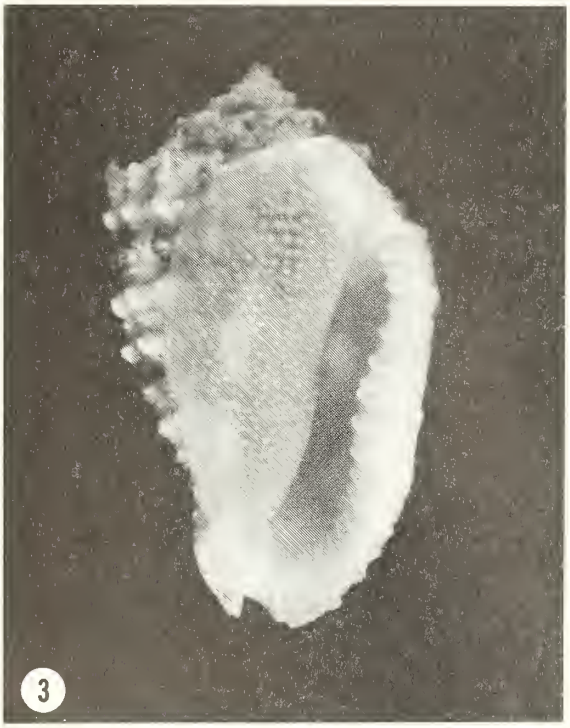


Figure 3. *Morum dennisoni* (Reeve, 1842). Caribbean species, trawled from off Venezuela, 57.0 mm.

Figure 4. *Morum lindae* Petuch, 1987. Caribbean species, taken by shrimp boats from off Colombia, 37.3 mm.

without a fully developed callus and a weakly denticulate lip were regarded as late stage subadults (Figure 8). Adult specimens had a fully extended callus and a thickened outer lip with denticles. As adults aged, the dorsal color pattern became reduced as the general exterior eroded.

Figure 8. Late subadult female specimen showing a developed parietal callus and early dentition along the inner surface of the outer lip, 33.47 mm.

With the exception of a very small juvenile (at 11 mm, see Figure 9 for comparison with adult), shell length of the specimens examined ranged from 31.00 mm to 42.3 mm. A fully mature male specimen from Bahía Iglesias measured 31.5 mm while an early subadult female from the same locality was the largest collected specimen at 42.3 mm (Figure 7). Among the specimens examined, male morums were smaller at maturity, with the largest collected being 37 mm. There was no discernible sexual difference either with the overall mass of the shells or their widths.

The gross anatomy of *Morum* has been adequately described by recent comparative studies with *Harpa* (Hughes, 1986; Hughes and Emerson, 1987). These works demonstrated a very close affinity between these two taxa, resulting in the phylogenetic reassignment of the morums from the Cassidae (as "mesogastropods") to Harpidae (neogastropods).

Gross similarities to *Harpa* were immediately apparent when observing the very active animals of *M. veleroae*. The anterior region of the foot is a highly facile propodium, shaped as a shield (Figure 10), and although morum feeding behavior is poorly known it can be suggested that this propodium is used to subdue prey, like small

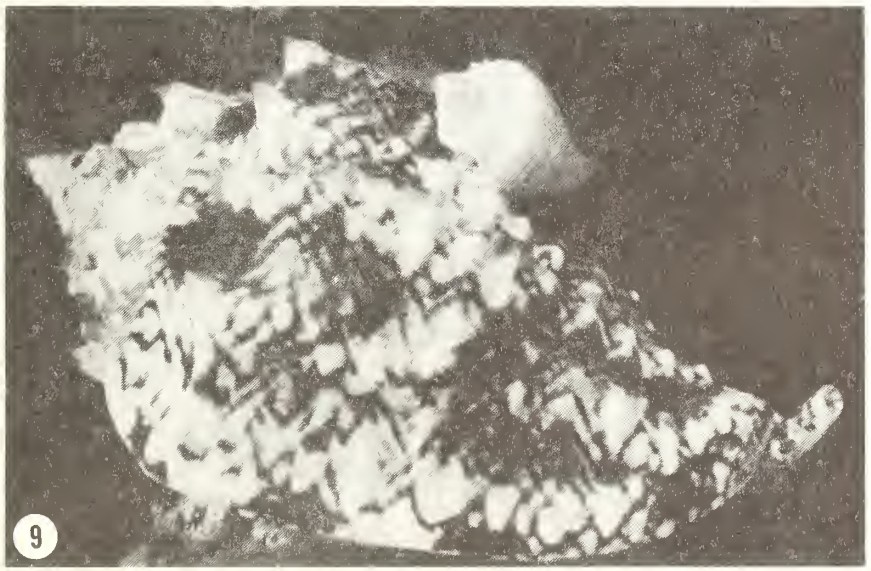
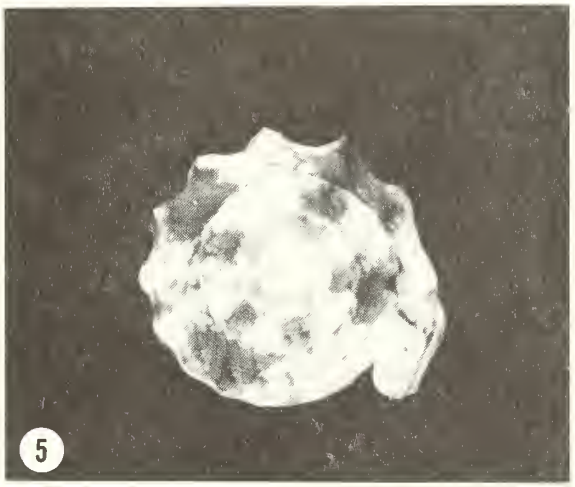
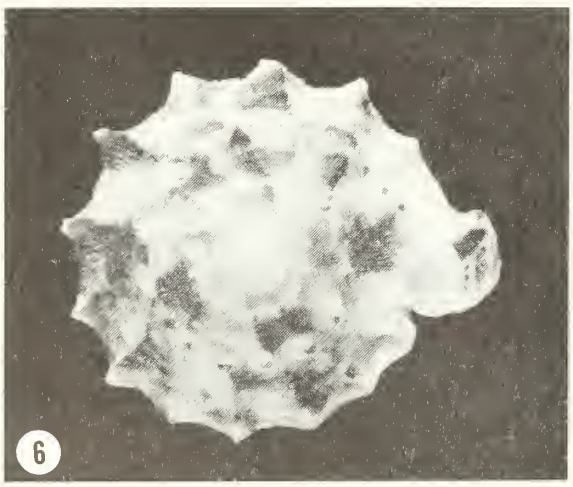


Figure 9. Very small juvenile specimen (11.0 mm) on the dorsum of adult specimen.

analogous *M. dennisoni* by citing the former's smaller size, more delicate sculpture and the lavender colored parietal callus, or shield (Plate 1, Figure 1). While they are quite obviously distinct, the current study shows a similarity by the presence of irregular brown patches on the spire (Figures 5-6), a characteristic which is not lost even as the color patterns become reduced in older specimens. As an added difference, none of the mature specimens of *M. veleroae* showed any thickening of the parietal callus in which the shield actually flares away from the surface of the underlying body whorl. This morphological feature is common with adult *M. dennisoni* as it is with other species of the *Oniscidia*, like *Morum grande* (A. Adams, 1855) from the western Pacific.





Figures 5 & 6. comparison of spire patterns between *M. veleroae* (Fig. 5) and *M. dennisoni* (Fig. 6) showing the similarity in the pattern of irregular patches of brown coloration.

Recent Collection and Observations

Using a dredge designed and operated by Dave Mulliner, 13 living specimens of *M. veleroae*, including six adults, were collected from three general sites around Cocos Island: off Bahía Iglesias in the east, Bahía Wafer on the west side and Bahía Chatham along the north coast. In each instance the substrate was coarse gravel and coralline rubble, richly populated with the bivalves *Glycymeris* and *Arca*. *Phos articularis* (Hinds, 1844) was a prominent common gastropod. Based on observing the action of the dredge in shallower water, we inferred that it was digging into the gravel substrate down to a depth of three inches.

Given the opportunity to examine a number of living specimens for the first time, evidence of sexual dimorphism was found by comparing the overall shell length of six male and seven female specimens relative to their maturity, indicated by the extent of the development of the parietal callus and outer lip. The degree of shell maturity can be divided into three groups. An early stage subadult has little or no coloration on the parietal callus and a thin fragile outer lip (Figure 7). Specimens

Figure 7. Early subadult female specimen of *M. veleroae* with poorly developed parietal callus and no denticles on the outer lip, 42.3 mm, the largest specimen taken.

crustaceans. It is also probably an essential instrument for rapid concealment in the substrate. Personal observations of living harps show that the animal can bury vertically (straight down) within a few seconds.

The main region of the foot is the metapodium on which the viscera and shell are attached. The posterior end of the metapodium holds a small operculum and can be autotomized, or detached, by the animal as a defensive measure, an event which occurred with two of the specimens during observation. Two other conspicuous aspects of the animal's external morphology are the long cephalic tentacles which hold the eyes and a long siphon (Figure 11).

The basic color of the animal ranged from light gray to pale yellow and is mottled with flecks of black, brown, bright yellow and white (Plate 1, Figure 2). These observations are similar to those by Angermeyer of a Galapagan specimen (Emerson, 1969). The dorsal surface of the long cephalic tentacles were tinged with bright yellow, particularly distal to the black eyes.

The radula of *M. veleroae* was not dissected as part of the present study, however the radula of *Morum tuberculosum* was found by Hughes (1986) to be very small and comprised of a single column of tricuspid teeth. While this characteristic could be consistent with all morums, it is not yet clear whether all the extant species actually have a radula. All the animals of the *M. veleroae* collected during the 1992 Cocos expedition are preserved in the collections at the Santa Barbara Museum of Natural History (53149), and are available for future study.

Figure 10. Extended animal of *M. veleroae* showing the anterior portion of the foot, the propodium. The metapodium connects to the viscera and shell and the posterior portion holds the small operculum.

Figure 11. Anterior view of active animal showing the mottled color pattern of the foot, the siphon and cephalic tentacles. The eyes are visible by looking at the animal's reflection.

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HALIOTIS ROBERTI AT COCOS ISLAND, COSTA RICA

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Haliotis roberti McLean, 1970, is not only one of the rarest species of Haliotidae but, at an average length of less than 20 mm, it is also among the smallest.

During the April 1992 expedition to Cocos Island, Costa Rica, a number of live specimens were collected. Most were dredged at depths around 76-91 m (250 to 300 ft), but a few were found clinging to coral and rubble brought up in tangle nets set at slightly lesser depths (Plate 1, Figure 3).

The color photograph (Plate 1, Figure 4) was produced from the first video footage ever taken of a living specimen of *H. roberti*. The camera used was an 8 mm sony Handy Cam and the still photo was produced by Perfect Image of San Diego.

The 24 mm specimen in the photo was one recovered from a dredge haul at approximately 87 m (287 ft) and brought aboard for study. During the short filming session, this animal "reared up" several times giving the appearance that it was looking straight into the camera. In fact, the animal was displaying an escape behavior typical to Haliotidae.

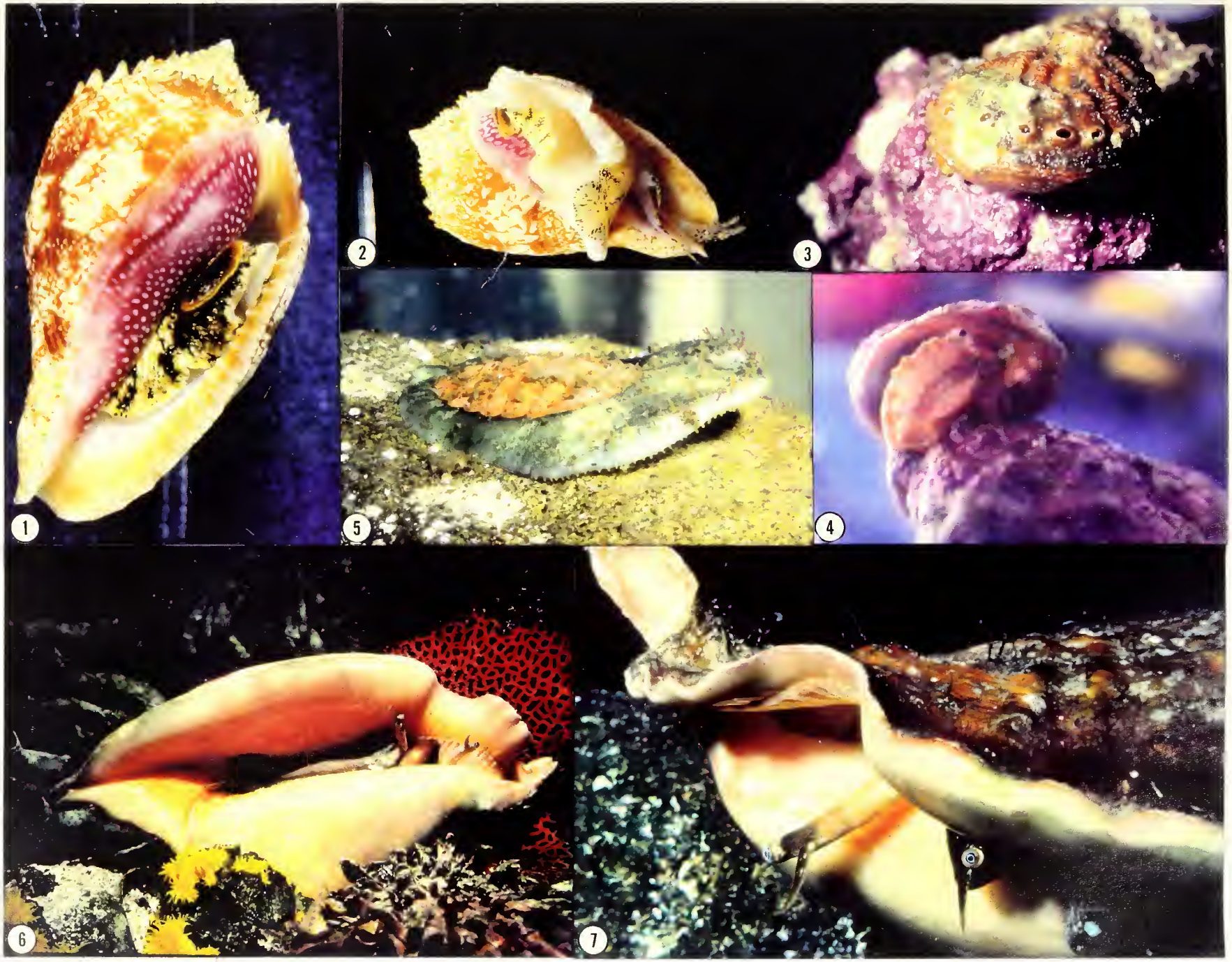

PLATE 1: Figures 1-2. *Morum veleroae*. (1) ventral view of adult male showing distinctive parietal callus and outer lip dentition, 39.15 mm (2) view of active animal showing color pattern of foot. Figures 3-4. *Haliotis roberti*. (3) on substrate (4) view of active animal. Figure 5. *Placiphorella rufa* with head area raised. Figures 6-7. *Strombus peruvianus*. (6) apertural view (7) closeup showing eyes. Photos: 1-2, H. W. Chaney; 3, D.K. Mulliner; 4, K. C. Hutsell; 5, L. J. Shaw; 6-7, A. Kerstitch.

A RANGE EXTENSION FOR *PLACIPHORELLA RUFA*

ROLAND C. ANDERSON

The Seattle Aquarium, Pier 59, Waterfront Park,
Seattle, Washington 98101-2059

Cape Flattery, on the northwest tip of Washington State, is probably the most scenic, rugged, and diverse coastal area in the state, if not the whole west coast. I described the area and its oceanographic details in Anderson (1991). Over the 25 years I have been visiting the area, either for pleasure or collecting for the Seattle Aquarium, I have seen many interesting and unusual marine life there, including year-round resident gray whales, cold-water gorgonians (*Swiftia spauldingi*), phalaropes, velutinas, and others. Thresher sharks and sea turtles have even been reported from this area. Recently, I have also found several specimens of *Placiphorella rufa* Berry, 1917, on Cape Flattery.

Placiphorella rufa was originally described from Forrester Island, Alaska (Berry, 1917) and has been primarily considered an Alaskan species (Abbott, 1974; Barr and Barr, 1983; Scott, et al., 1990). Recently, the range of *P. rufa* has been extended south to Barkley Sound on the west coast of Vancouver Island (Clark, 1991). I reported *P. rufa* from Port Renfrew on the southern coast of Vancouver Island (Anderson, 1992). The animal pictured (Plate 1, Figure 5) is in the collection of Jules and Carole Hertz (San Diego, California). I found two more animals this summer (2 August 1992) at Slant Rock (Cape Flattery, near Neah Bay, Washington, lat: 48° 23.54' N, long: 124° 41.72' W). They were found while diving at 25 meters depth, on rock surfaces covered with colonial tunicates, cup corals, and coralline algae. The water temperature was 6° C (in August!). The animals were live-collected and transferred to the Seattle Aquarium. One specimen was donated to the Santa Barbara Museum of Natural History (SBMNH 35625), and the other is in the collection of Elsie Marshall (Seattle, Washington).

While this range extension is not long as far as distance goes, about 80 km, it crosses the Strait of Juan de Fuca, and brings the animal into Washington.

The color photo of *P. rufa* was taken by Leo Shaw of the Seattle Aquarium.

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A RANGE EXTENSION FOR *STROMBUS PERUVIANUS* AND A RECORD SIZE *CYPRAEA ISABELLAMEXICANA*

ALEX KERSTITCH

10700 Calle Vaqueros, Tucson, AZ 85749

On August 4, 1992, in 37 m (120 ft) depth in the Sea of Cortez off Isla Peruano, Guaymas, Sonora, Mexico, I collected a live, 208 mm *Strombus peruvianus* Swainson, 1823 (Plate 1, Figures 6-7). This is a new northern extension record. I believe this species was previously reported from Islas Tres Marias, off the southern coast of Mexico.

Although I have logged over 300 collecting dives at Isla Peruano alone the past ten years I have never seen this species at this locality, nor anywhere in the Gulf, and El Niño is indirectly responsible. The specimen was found exposed in the midst of a forest of the black coral, *Antipathes galapagensis*. This patch is about 46 m long by about 18 m wide. Under normal conditions when the coral is healthy it is impossible to swim among the branches of this coral because of the density of the yellow polyps, and even less possible to see the bottom and base of this forest.

However, because the water off Sonora has been unusually warm due to El Niño, this black coral patch is in very poor condition. The polyps are dying and the coral "trees" look like leafless trees on land in winter. Therefore, for the first time I was able to swim in the midst of this patch and discovered my specimen. I believe this species has been there right along under the protective branches of the coral. This *Strombus* is still alive in my aquarium and feeds mostly on algae.

Figure 1 represents a new world record size for *Cypraea isabellamexicana*. The shell was collected dead in the Gulf in 18 m (60 ft) depth at Isla San Pedro Martir, off Sonora, West Mexico. The shell measures exactly 60 mm by 38 mm and is not in the best condition, but it is a record nevertheless.

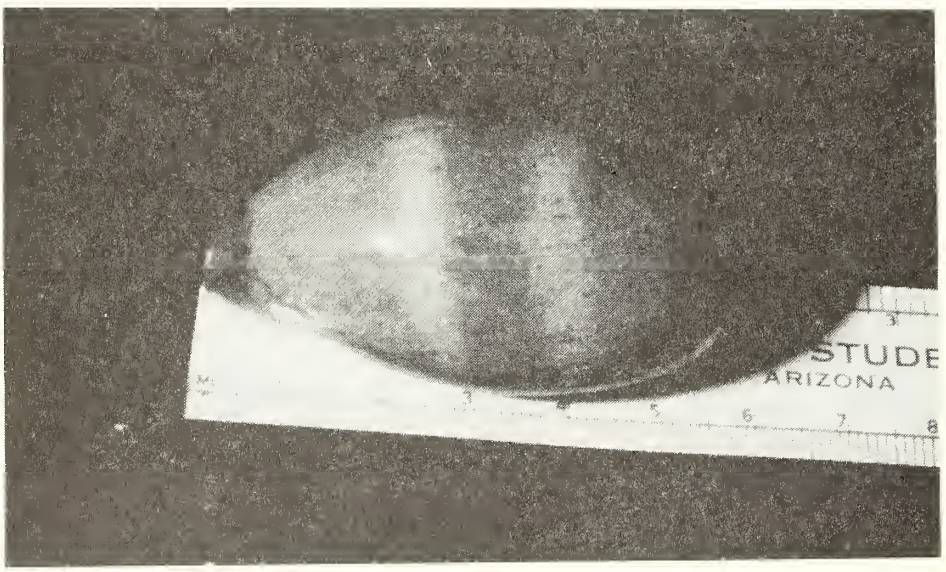

Figure 1. *Cypraea isabellamexicana*, 60 x 38 mm specimen from Isla San Pedro Martir, Gulf of California, Mexico.

BOOK NEWS

THE GENUS *CHICOREUS* AND RELATED GENERA (GASTROPODA:MURICINAE) IN THE INDO-WEST PACIFIC

By: Roland Houart. 1992

Memoires de Museum National d'Histoire Naturelle, Zoologie, tome (A) 154, 188 pp., 480 figs., 4 tables. Price: Dfl 125.00 (about US $74.00) plus postage.

The long-awaited study of the muricid genus *Chicoreus* has finally appeared and it was well worth the wait. Houart has done a superb job of making sense of a complicated group. In the systematics there will not be too many changes to cause pain to the collector. Only one "familiar" species has disappeared, that being *C. penchinati* (Crosse), which has disappeared into the synonymy of *C. strigatus* (Reeve). Species of what heretofore have been considered to be *Chicoreus* s.s. are divided into a subgenus *Chicoreus* s.s., characterized by the presence of a labral tooth, and a subgenus *Triplex* Perry, lacking this tooth. Having participated in the dismemberment of *Murex* s.s. on the same grounds, I can scarcely find fault with this division. One new subgeneric taxon is proposed, *Chicopinnatus* (type species: *Pterynotus orchidiflorus* Shikama), for those few species that have the superficial appearance of the genus *Pterynotus*, with three winged varices, but have the early development of *Chicoreus*.

The two taxa *Naquetia* Jousseaume and *Chicomurex* Arakawa, formerly considered to be subgenera of *Chicoreus* are elevated to generic level (these are the "related genera" of the title) on the basis of their radular morphology.

The general format of the book and its overall excellent quality is a tribute to Philippe Bouchet, of the Museum National d'Histoire Naturelle. The only serious error that I have encountered is the omission of any explanation for figure 302, which is a specimen of *C. rubescens* (Broderip, 1833) identified in a subsequent work (Apex, 1992, v. 7, nos. 3-4, fig. 4) as a specimen in Houart's collection -- 47.88 mm, from ?Tahiti.

Species of the muricid genus *Chicoreus* Montfort are arguably the most beautiful of the family; certainly they are the most numerous in numbers of species (about 90 world-wide) and, as they frequently occur in shallow water or even intertidal environments, they are well-represented in most collections. They are also the most complex of the groups in the Muricinae, as a result of a more than usual amount of intra-specific variation.

Just to give an idea of the magnitude of the problem, Houart has accepted a total of 64 Recent taxa in the three genera he is monographing. These 64 species have a total of 77 synonyms between them. If one excludes those 16, mostly deep-water forms, that have been named since 1980, the numbers are even more daunting: 48 species with 77 synonyms. One well-known species, *Chicoreus brunneus* (Link), alone has ten synonyms.

To establish these synonymies Houart has done an amazing job of locating type material and especially of figuring these obscure types. Of the over 400 illustrations of specimens, one third represents type material. This alone makes the book worth its somewhat hefty price. But even more than that, the illustrations are uniformly well done, and the four plates of color illustrations are especially gorgeous.

In addition to the large number of illustrations of specimens there are also distribution maps for each taxon, and of extreme value are the enlarged drawings of protoconchs for 55 Recent species (often more than one example) and six fossil species.

EMILY H. VOKES

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

COME TO THE AUCTION/POTLUCK!
Saturday evening, April 24, 1993
6:00 PM-?
For details, see page 34 and map on last page.
There is no regular meeting this month.

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - March 18, 1993

The meeting was called to order by President Carole Hertz at 7:40 PM. After welcoming members and introducing guests, the Minutes of the February meeting were accepted as corrected [meeting date in **The Festivus** changed to February 18, 1993].

The Club has instituted a new policy in which out-of-town speakers and local non-member speakers are invited to dinner before the meeting. Dinners will be at the Cafe del Rey Moro and begin at 6 PM. If interested in joining the no host dinner group, notify Hugh Bradner (459-7681).

Club member Kim Hutsell brought in a beautiful display of pectens to complement his freewheeling discussion on Specializing. Both the discussion and display were appreciated by all.

A special door prize of *Cassis rufa*, donated by an anonymous contributor, was won by Michael Hollmann. A social time followed with a specially decorated cake for the Hutsells, who will be leaving San Diego at the end of April, provided by the Bradners.

Additions to the Roster

American Museum of Natural History, Central Park West at 79th St., New York, NY 10024.

Gabelish, Tony, 22 Kirkham Hills Terrace, Maylands, Western Australia, Australia.

Rice, Tom, P.O. Box 219, Port Gamble, WA 98364. (206) 277-2426.

Wilson, Barry, 4 St. Ives Loop, Kallaroo, Western Australia 6025, Australia.

The Auction/Potluck on April 24th

The Auction/Potluck, to be held at the clubhouse at Wes Farmer's condo (see map, last page), will begin at 6 PM with "relaxing fluid." The potluck dinner will begin at 7 PM and the auction at 8 PM.

A signup sheet for potuck contributions was passed at the March meeting. If you were unable to attend the meeting, call Carole Hertz (277-6259) or Larry Buck (792-5404) and sign up for your potluck contribution.

Your shell donations are also needed. If you have a contribution, please call a board member and arrange for pickup.

Several more fantastic donations have been received including a shell drawing specially done for the auction. It's going to be a wild and wonderful time. Don't miss the most exciting Club function of the year. Hope we see you there!

1993 Annual Meeting of the Western Society of Malacologists Announced

The 26th annual meeting of the Western Society of Malacologists (WSM) will be held in La Jolla, California from June 27 to July 1, 1993 at the Radisson Hotel La Jolla (formerly La Jolla Village Inn).

This year the agenda will feature two symposia: "Contemporary Research on Mollusca" and "Malacofauna of western Mexico" as well as contributed papers, a special "Photography of Mollusks" poster session, evening visit to Sea World, exhibits, shell auction, reprint sale and a banquet featuring a sure-to-be-entertaining presentation by Dr. Barry Wilson (author of an important new book on gastropods of Australia).

Contributed papers are requested. For a contributed paper application or for poster forms, contact either President Douglas J. Eernisse, Museum of Zoology, University of Michigan, Ann Arbor, MI 48109-1079 or Paul Scott, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, CA 93105. Applications must be returned no later than May 15th.

Come to the Bizarre Bazaar

The fourth annual shell bazaar will be on Saturday May 15th at 1 PM at the Mulliner's garden, 5283 Vickie Drive, San Diego, 92109. Bring your shells, shell related items and table and enjoy buying, selling, trading and admiring.

NOTES ON FOUR SPECIES OF MINUTE INDO-PACIFIC GASTROPODS

DONALD R. SHASKY

834 W. Highland Avenue, Redlands, California 92373

In 1956, the Australian malacologist C. F. Laseron published a lengthy monograph titled "The Family Rissoinidae and Rissoidae (Mollusca) from the Solanderian and Damperian Zoological Provinces." The Solanderian Province extends from just north of Brisbane to southern New Guinea and it includes the Coral Sea and the Torres Strait along the northern shore of Australia. The Damperian Province is all of the northern Australian coast west of the Torres Strait. Laseron's treatise is the only comprehensive work on rissoacean species from these faunal provinces. In addition to these two provinces, a collection of mollusks from Christmas Island in the Indian Ocean south of Java was also included.

Laseron dealt with 167 species and 47 genera. One hundred thirty-one of these species and 27 of the genera were proposed as new; eighteen of the species are from Christmas Island in the Indian Ocean. Remarkably, all of the specimens he used in his work were dead collected and several of the genera and species were erected from single specimens. Laseron believed that many of the genera would be relocated to other families when their anatomies and life histories became known.

Genera that Laseron cited as rissoacean have subsequently been removed to other groups by Ponder (1985), including the Cerithiidae, Vitrinellidae, Eulimidae and Pyramidellidae. The four genera and species treated in the present paper are those that Ponder has reassigned. My collecting, supplemented by the collecting of Douglas von Kriegelstein, demonstrates that species that Laseron thought might be endemic to Christmas Island or to northern Australia do, in fact, occur more widely.

Discrevinia balba Laseron, 1956 (Figures 1, 2)

Figures 1, 2. *Discrevinia balba* Laseron, 1956. Length: 2.1 mm. Locality: Anemwanot Island, Majuro Atoll, Marshall Islands, 21-28 m in the lagoon, May 5, 1991. Leg. D. Shasky. (1) apertural (2) dorsal. Photos: D. K. Mulliner.

This species was described from a single specimen from

Christmas Island. Laseron's illustration of the shell is a sketch which is quite dissimilar to the drawings of the same shell illustrated by Ponder (1985: 105, fig. 73a-b) which shows a marked repaired fracture. Ponder, in his discussion of *Discrevinia balba*, allocated it to the family Vitrinellidae. He adds, however, that the familial position of the genus is questionable. To my knowledge, Laseron's and Ponder's citations are the only references to this taxa.

The following lots of this species are in my collection:

(1) 21 m (70 ft) in siftings, off Oyster Cay, North Queensland, Australia. 1991. Leg. D. Shasky. 1 specimen.
(2) 8-33 m (25-107 ft) under coral, north side of Sipidan Island, Sabah, Malaysia. June 11-16, 1990. 1 specimen.
(3) 15-28 m (50-90 ft) on coral, outside the outer reef, Ine Island, Arno Atoll, Marshall Islands. Sept. 2, 1992. Leg. D. Shasky. 25 specimens (several live-collected).
(4) 1.5 m (5 ft) on coral, in the lagoon between Lobikaere and Enigu Islands, Majuro Atoll, Marshall Islands. May 5, 1991. Leg. D. Shasky. 2 specimens.
(5) 21-28 m (70-91 ft), in the lagoon of Anemwanot Island, Majuro Atoll, Marshall Islands. May 5, 1991 and Aug. 9 - Sept. 1, 1992. Leg. D. Shasky. 4 specimens (Figures 1-2).
(6) to 24 m (80 ft) under coral, passage between Koror and Babeldaob, Palau. Sept. 27, 1987. Leg. D. von Kriegelstein. 3 specimens.
(7) 9-24 m (30-80 ft) under coral, outside Jokaj Passage, Phonpei. Sept. 16, 1987. Leg. D. von Kriegelstein. 10 specimens (some live-collected).

Palisadia subulata Laseron, 1956 (Figure 3)

Perhaps the most exotically shaped minute marine gastropod extant is *Palisadia subulata*, the type of *Palisadia*. It is unique and could not be confused with any other species. *Palisadia subulata* is another taxon that Laseron named from a single specimen from Christmas Island. Ponder (1985:108, 199, fig. 15a, b) reassigned this genus to the Eulimidae. He mentioned that "A few shells of this rare species have been obtained in northeastern Australia" and are in the Australian Museum.

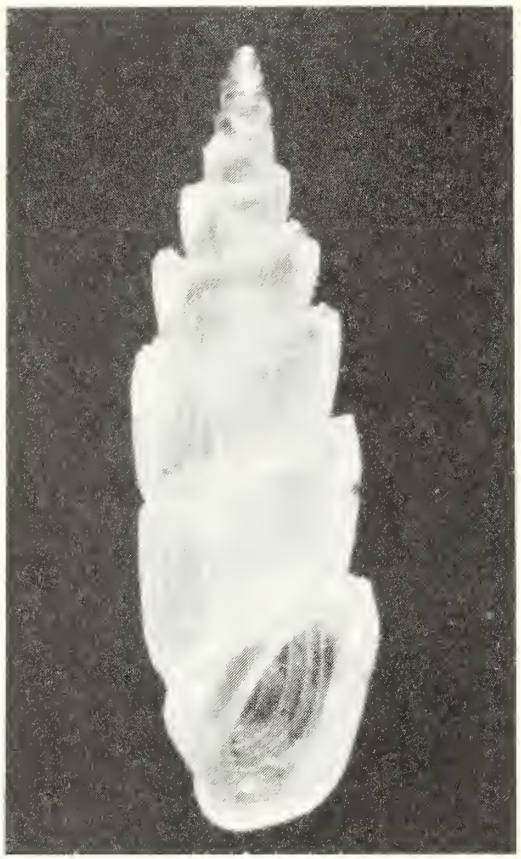

Figure 3. *Palisadia subulata* Laseron, 1956. Length: 3.1 mm. Locality: outside Jokaj Passage, Phonpei, 9-24 m under coral, Sept. 16, 1987. Leg. D. von Kriegelstein. Photo: B. Draper.

The following lots are in my collection:

(1) 9-24 m (30-80 ft) under coral, outside Jokaj Passage, Phonpei. Sept. 16, 1987. Leg. D. von Kriegelstein. 1 specimen (Figure 3).
(2) to 24 m (80 ft) under coral, passage between Koror and Babeldaob, Palau. Sept. 27, 1987. Leg. D. von Kriegelstein. 1 specimen.
(3) 15-28 m (50-90 ft) under coral, Palau. Sept. 28, 1987. Leg. D. von Kriegelstein. 1 specimen.
(4) 8-33 m (27-107 ft) under coral, north side of Sipidan Island, Sabah Malaysia. June 11-16, 1990. Leg. D. Shasky. 2 specimens.

Costabieta horrida (Garrett, 1873) (Figures 4-5)

Costabieta paucina Laseron, 1956, was described from Michaelmas Cay off Cairns, North Queensland, Australia, from three specimens collected by Tom Iredale. Ponder (1985: 108 - 109, fig. 75c, d)

synonymized *Rissoina horrida* Garrett, 1873, with *C. paucina*. Ponder stated that, "*C. horrida* is a pyramidellid with the first whorl of the protoconch inverted and a weak columellar plication. Examination of living material from Queensland shows the animal to be typical of Pyramidellidae."

I have *C. horrida* from the following localities in my collection:

(1) 3-5.5 m (9-18 ft) on coral, southwest side of Fitzroy Island, North Queensland, Australia. Sept. 18, 1991. Leg. D. Shasky. 2 specimens.
(2) 1-3 m (3-10 ft) on coral, Woneedaly Passage, Yap. Sept. 24-25, 1987. Leg. D. von Kriegelstein. 2 specimens.
(3) 1.5 m (5 ft) in coral, sand and eel grass on northeast side of Yap above Colonia. Sept. 25, 1987. Leg. D. von Kriegelstein. 1 specimen.
(4) 1.5-28 m (5-90 ft) on coral, Muteremdiu Wall, Palau. Sept. 28, 1987. Leg. D. von Kriegelstein. 1 specimen.

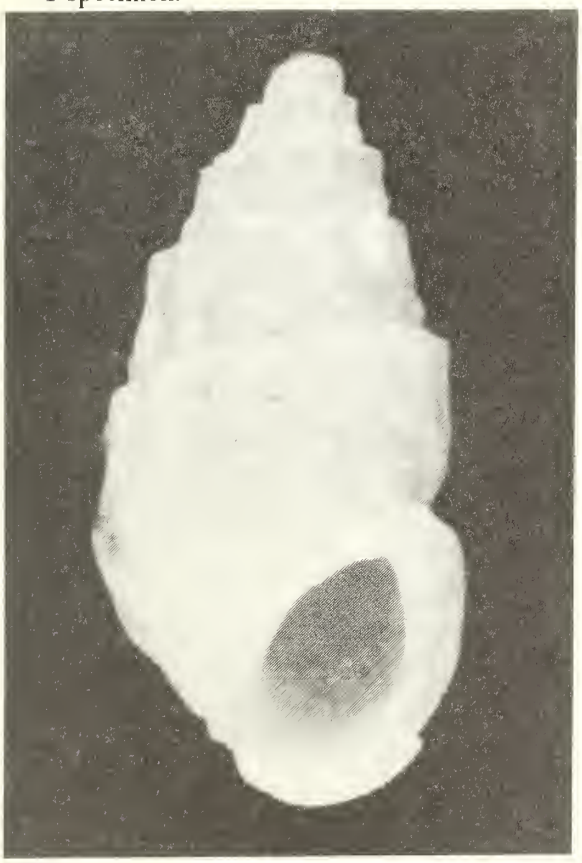

Figure 4. *Costabieta horrida* (Garrett, 1873). Length 3.3 mm. Locality: Woneedaly Passage, Yap, 1-3 m on coral, Sept. 24-25, 1987. Leg. D. von Kriegelstein. Photo: D. K. Mulliner.

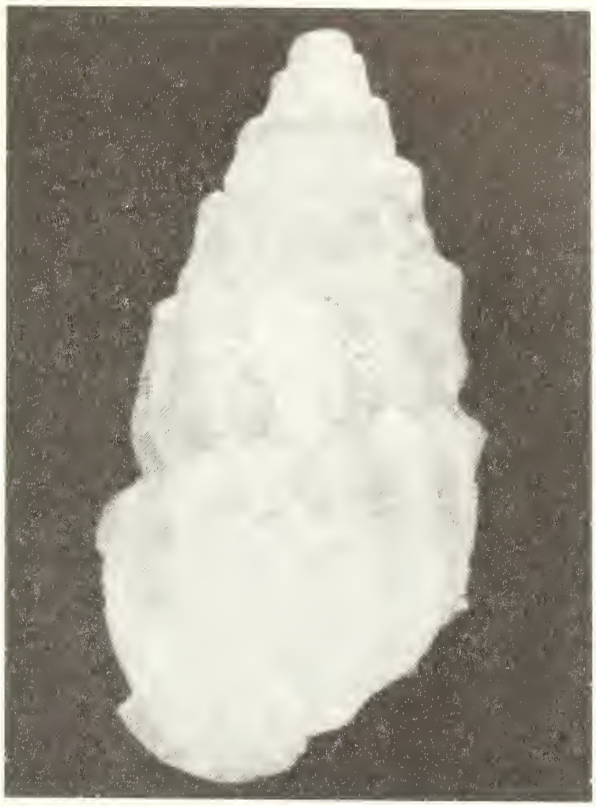

Figure 5. *Costabieta horrida*, dorsal view of specimen in Figure 4. Photo: D. K. Mulliner.

Herewardia kesteveni (Hedley, 1907) (Figures 6, 7)

Hedley described *Rissoina kesteveni* from a specimen taken from 31-37 m (17-20 fm) off Masthead Island in the Capricorn Group, Queensland, Australia. Iredale (1955) erected the genus *Herewardia* with *R. kesteveni* as the genotype. Laseron (1956), in discussing this species, stated that "It is evidentally a rare species, perhaps confined to deep water. The range, however, is fairly wide, as a specimen in the Australian Museum is from Murray Island." Ponder's only comment on this shell (1985:108-109, fig. 75e, f) is that "the type species of this genus appears to be a pyramidellid from examination of the shell."

Below I list the localities of specimens in my collection. It is obvious that it has a wide range:

(1) 1.5 m (5 ft) in coral, sand and eel grass northeast side above Colonia, Yap. Sept. 25, 1987. Leg. D. von Kriegelstein. 1 specimen.
(2) 1-3 m (3-10 ft), Woneedaly Passage, Yap. Sept.

24-25, 1987. Leg. D. von Kriegelstein. 1 specimen.

(3) 3-25 m (10-82 ft) under coral in lagoon, Rairik Island, Majuro Atoll, Marshall Islands. Aug.-Sept. 4, 1992. Leg. D. Shasky. 1 specimen.

(4) 0.2-0.6 m (0.5-2 ft) on coral, Taharuu, Papara, Tahiti, F.P. Dec. 26, 1990. Leg. D. Shasky. 1 specimen.

(5) intertidally under dead coral, Pte. Venus, Manina, Tahiti, F.P. Jan. 7, 1983, Dec. 22, 1988, Dec. 1990. Leg. D. Shasky. 42 specimens (includes live taken specimens).

(6) 0.2-0.3 m (0.5-1 ft) under south side of Motu Araara, Parea, Huahine, F.P. Jan. 4, 1983. Leg. D. Shasky. 3 specimens.

(7) 0.9-1.5 m (3-5 ft) under dead coral inside the reef, Motu Vavara, Huahine, F.P. Jan. 4, 1983. Leg. D. Shasky. 3 specimens.

(8) 0.3-1.2 m (1-4 ft) under dead coral, Motu Ahuna, Bora Bora, F.P. Dec. 29, 1988. Leg. D. Shasky. 2 specimens.

ACKNOWLEDGMENTS

I wish to thank Dr. Winston Ponder for identifying my first specimen of *Discrevinia balba*. I also wish to thank both Dave Mulliner and Bert Draper for the excellent photographs for this paper and Dr. James McLean for supplying me with a copy of Laseron's monograph.

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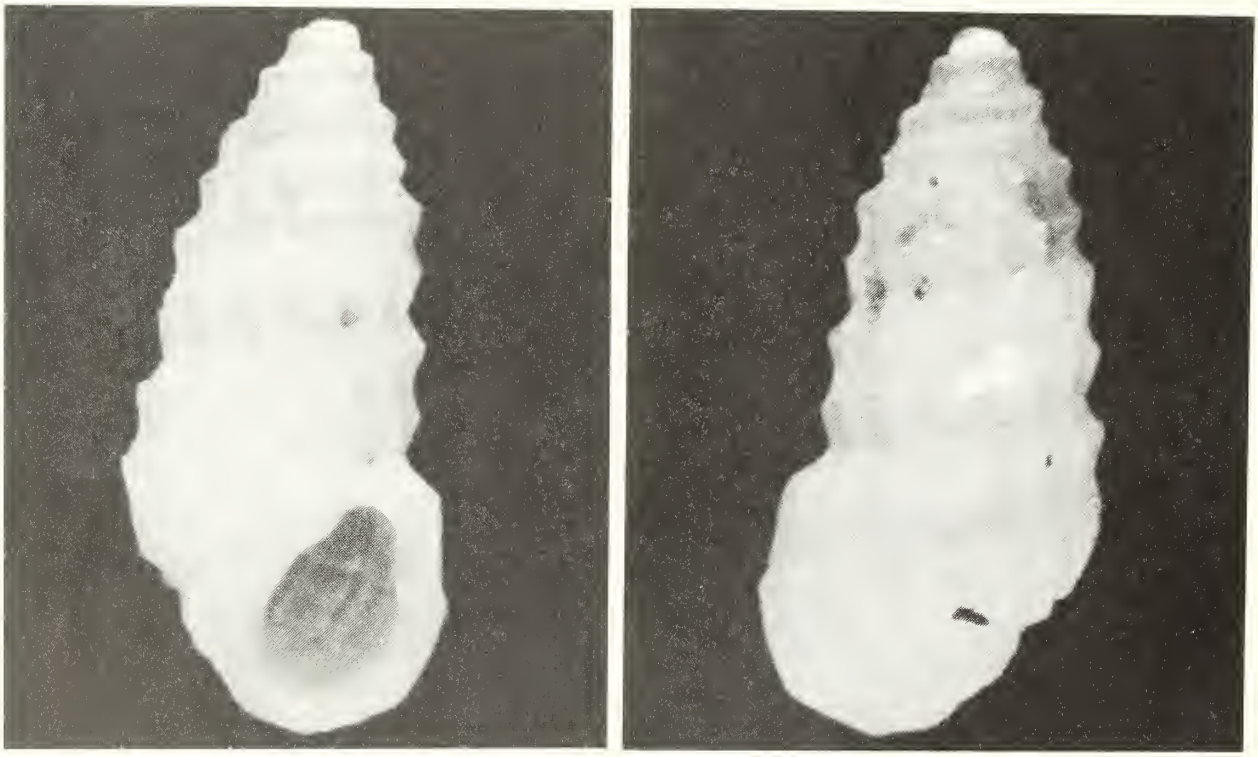


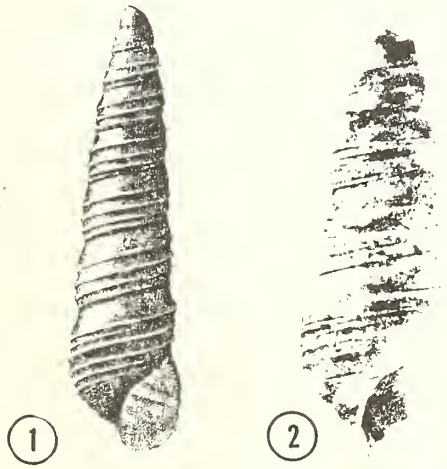
Figures 6, 7. *Herewardia kesteveni* (Hedley, 1907). Length: 2.8 mm. Locality: Pte. Venus, Manina, Tahiti, F. P., 0.2-0.6 m under dead coral, Dec. 1988, Dec. 1990. Leg. D. Shasky. (6) apertural (7) dorsal. Photos: D. K. Mulliner.

PANAMIC PUZZLES: A SINGULAR *CINGULINA*

ROBERT KOCH

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road
Santa Barbara, California 93105

In 1917 Bartsch described *Turbonilla (Cingulina) urdeneta* (Figure 1) from 47 specimens dredged in the vicinity of Bahía Magdalena along the Pacific coast of Baja California Sur, Mexico. Twenty-two years later, in 1939, Strong and Hertlein described *Turbonilla (Cingulina) academica* (Figure 2) from a set of six shells dredged in Bahía Honda, Panamá. Both taxa are readily distinguishable by the prominent spiral keels or cords encircling the teleoconch whorls.



Figures 1 & 2. (1) *Turbonilla (Cingulina) urdeneta* Bartsch, 1917. Holotype. (USNM 267740). Length: 5.7 mm. Type locality: vicinity of Bahía Magdalena, Baja California, Mexico. After Bartsch, 1917. (2) *Turbonilla (Cingulina) academica* Strong & Hertlein, 1939. Holotype. (CAS 751). Length: 2.7 mm. Type locality: Bahía Honda, Veragua, Panama. After Strong & Hertlein, 1939.

Keen (1971) listed *Cingulina* as a subgenus of *Turbonilla*. Following Keen only two subsequent references, of which I'm aware, relate to these descriptions. Abbott (1974) placed *Cingulina*, as a genus, in the subfamily Odostomiinae but listed only *C. urdeneta* and one other Panamic species, with no synonyms, compared to the four cited in Keen. Shasky (1984) included *C. urdeneta* in his checklist of marine mollusks from Manabí Province, Ecuador.

It is my belief that these supposed two species are conspecific. The descriptions are remarkably similar in many respects. As described, the nuclei are almost identical if not the same. There are only minor variations relating to the strength or absence of microscopic axial threads and spiral striations. And, as stated by Strong and Hertlein *C. academica* "...resembles *Turbonilla urdeneta* Bartsch...but is smaller and has only 3 instead of 4 spiral keels [on the final whorl]." Size and the number of spiral keels on each teleoconch whorl are the major differences, but are explicable. The *C. urdeneta* holotype measures 5.7 mm in length with my postnuclear whorl count of 8½ turns, while the holotype of *C. academica* is just 2.7 mm in length with 5½ whorls. The spiral cords on *C. urdeneta* are described as none on the first teleoconch turn, 2 on the second, 3 on the next three whorls and 4 on the rest. *Cingulina academica* was said to exhibit one on the first and second whorls, 2 on the third and 3 on the others.

The Skoglund and Koch collections together contain over 150 specimens dredged from the Bahía de Panamá. In the range of 3 mm in length (and recalling that the Strong and Hertlein type lot was merely six shells) any number make an excellent match for *C. academica* of three spiral keels on the final turn. At the 4 mm size and larger many evidence a fourth keel as with *C. urdeneta*. In our lots there are other variations in width and sculpture with some lacking a cord on the initial postnuclear whorl while others over 4 mm have five keels, somewhat more subdued, on the last whorl. The representatives of this material shown in Figures 3 and 4 are now in the collection of the

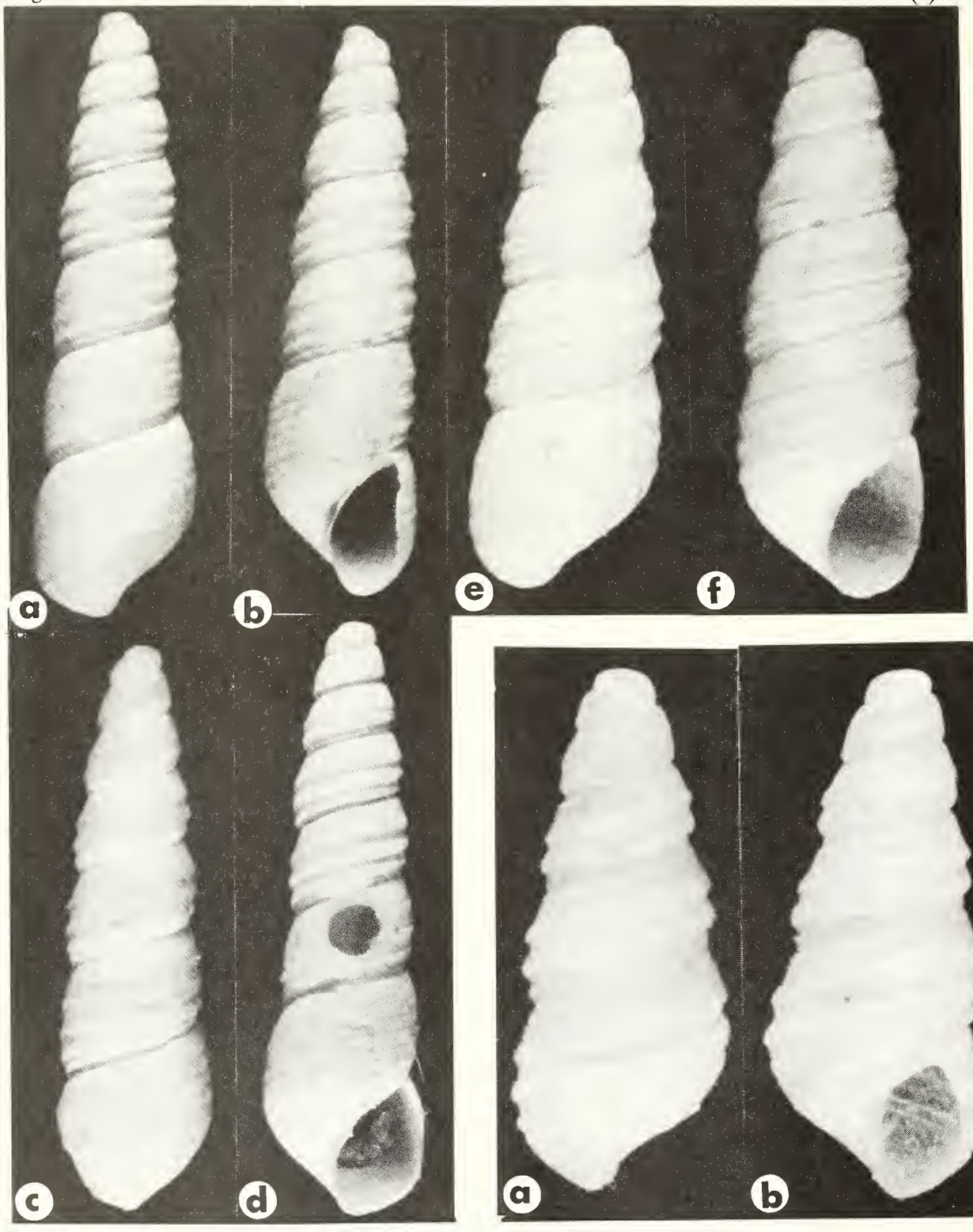


Figure 3 a-f. Dorsal and apertural views of three specimens dredged from the Bahía de Panamá. (a-d) Two 4.0 mm+ shells exhibiting the sculptural pattern of *Cingulina urdeneta*; (e-f) A juvenile of approximately 2.7 mm matching the description of *C. academica*. Leg. R. Koch. SBMNH 35636.

Figure 4 a-b. A juvenile specimen dredged off Puerto San Carlos, Bahía Magdalena (near the type locality of *Cingulina urdeneta*) approximately 2.5 mm and answering the description of *C. academica*. Leg. C. & P. Skoglund. SBMNH 35637.
Photos: D.K. Mulliner.

Santa Barbara Museum of Natural History. Our specimens, wherever the location, all evidence similar nuclei. *Cingulina academica* (Strong and Hertlein, 1939) appears to be a juvenile of *C. urdeneta* (Bartsch, 1917).

Distribution may be more or less continuous through the Province. Collecting sites from the Skoglund and Koch collections, together with other available citations, are as follows: Bahía Magdalena, Baja California Sur (Pacific side) (Bartsch, 1917 and the Skoglund collection)(Figure 4); Isla Espíritu Santo (Baker, Hanna & Strong, 1928) and Bahía Concepción, Baja California Sur (Gulf side); Puerto Peñasco and Isla San Jorge, Sonora, Mexico (upper Gulf of California); La Cruz de Huanacaxtle (Bahía de Banderas), Nayarit, Mexico; Bahía Honda (Strong & Hertlein, 1939, as *C. academica*) and Bahía de Panamá, Panamá (Figure 3); Manabí Province (Shasky, 1984) and Salinas, Guayas Province, Ecuador.

ACKNOWLEDGMENTS

My deep appreciation to Carol Skoglund for the loan of material from her extensive Panamic collection and to David Mulliner for his excellent photographic assistance.

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STUDENT RESEARCH GRANT IN MALACOLOGY

The Western Society of Malacologists (WSM), in conjunction with the Santa Barbara Shell Club and the San Diego Shell Club, as part of their commitment to the continued study of mollusks, are offering a student research grant in malacology. One or more research grants up to $1000 are available to applicants who are full time students in formal graduate or undergraduate degree programs. The thesis, dissertation or research project must be focused primarily on the systematics, biology, ecology, physiology, biochemistry, or paleontology of marine, terrestrial or freshwater mollusks. Research currently in progress or beginning in the 1993-1994 academic year will be considered.

Completed applications must be received no later than 15 May 1993 and awards will be announced by 30 July 1993. For further information or application form contact: Paul Scott (805) 682-4711 (ext 319).

BOOK NEWS

THE EDGE OF THE FOSSIL SEA
By: Edward J. Petuch, 1992.
Publisher: Bailey-Matthews Shell Museum,
P.O. Box 1580, Sanibel, Florida 33957.
Price: $14.00 postpaid. Florida residents add $.84 tax; 20% discount to museum members.

A rag, a bone, and a hank of hair--from this the fool constructed a vision of his "lady fair." From little more than these the paleontologist must reconstruct entire ecosystems. This is not as difficult as it sounds--all it takes is a thorough knowledge of the habitat requirements of living land and marine animals and plants, plus a lively imagination.

Ed Petuch fortunately is blessed with both. And thus his new book, which, as the title implies, is a tribute to the late Rachel Carson, is a wonderful synthesis of Pleistocene life along the margin of the Okeechobee Sea (a.k.a. the Florida Platform).

From a bunch of fossil shells, a few fragments of bones, and an encyclopedic knowledge of the living Caribbean molluscan fauna, Petuch has conjured up a vision of a beautiful tropical landscape similar to that of the present-day Bahama Islands, with coral reefs along the margins, mangrove swamps to the north, low-lying sandy islands with bizarre animals prowling the forests and seals basking on the shores, whales frolicking in the central lagoon, and in the shallow marine waters myriad snails and clams living out their daily dramas.

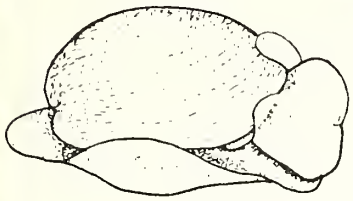
For the reader who perhaps has never witnessed modern scenes such as are described in the book, delightful sketches supplement the text--sometimes accompanied by slightly lavender, if not positively purple, prose, such as "A flock of gulls takes flight in a cacophony of screams, while a line of violent thunderstorms approaches from the west." Rachel herself could not have phrased it better!

If I have any complaint about the book it is the unending litany of common shell names that tend to overwhelm the casual reader--do names like "Petit's Grinning Tun" or "Linda's Seminole Snail" convey any more information to the average person than would *Malea petiti* or *Seminolina lindae*? In the plate explanations both common and scientific names are used; it is a pity that this could not have been done in the text as well.

Except for this minor aggravation, the book is a marvelous introduction to paleoecology. It demonstrates to the average person what it is that we molluscan paleontologists really are doing. We are not simply gathering up pretty specimens, magpie-fashion, to put into museum drawers to gather dust. We are attempting to recreate the world of the past in all its astonishing diversity and beauty. Thanks, Ed.

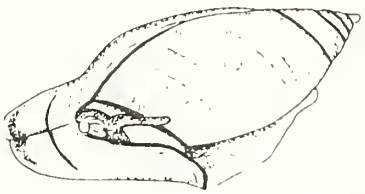
EMILY H. VOKES

SAN DIEGO SHELL CLUB



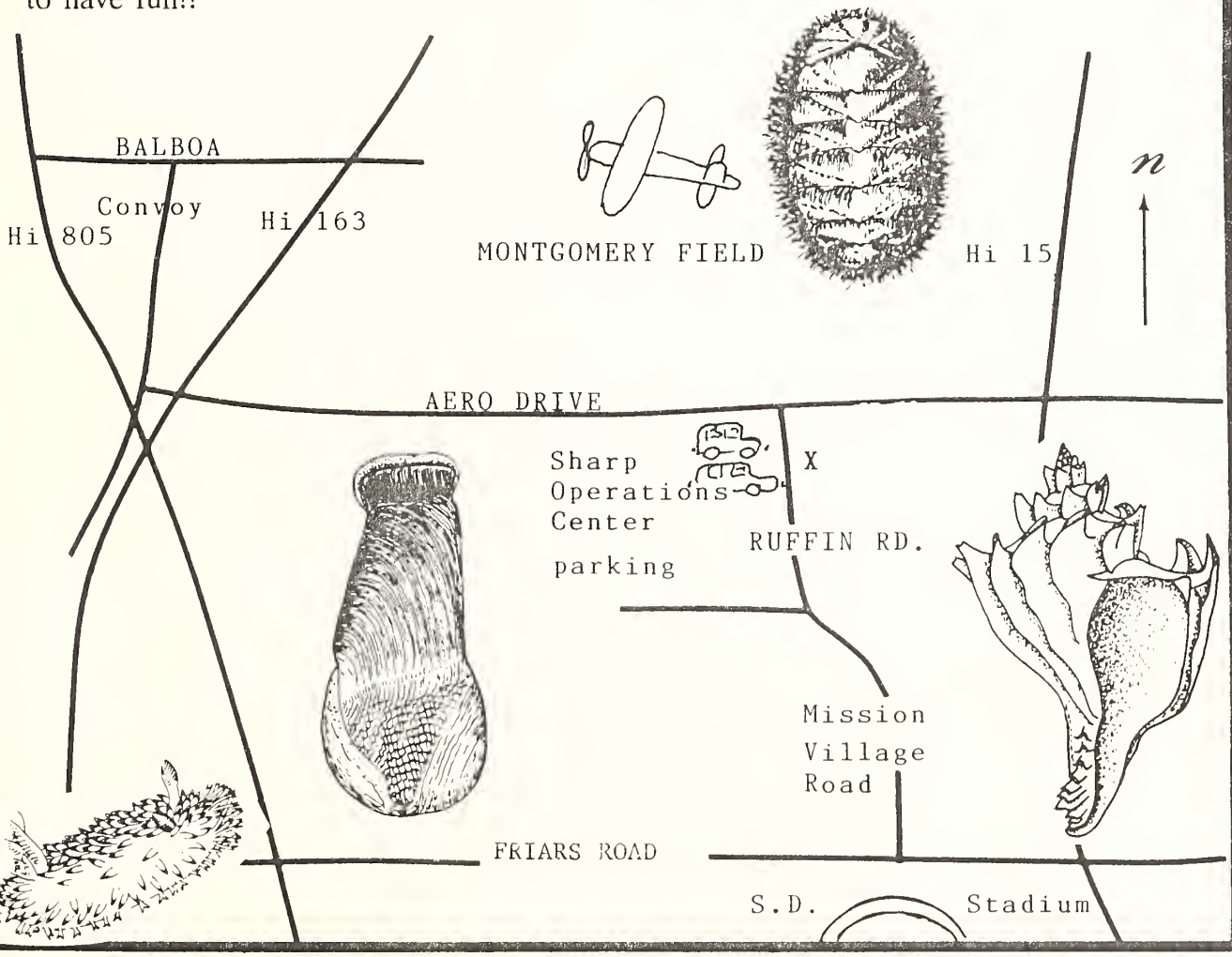
AUCTION/POTLUCK

APRIL 24, 1993



DIRECTIONS TO THE AUCTION: from 805: exit onto Balboa, east to Convoy, south to Aero Dr., east to Ruffin Rd., south about a block or two. Clubhouse on East side of street; park at Sharp Operations Center on West side.
From San Diego Stadium on Friars Road: up Mission Village Drive to Ruffin Rd., right turn or north about a half mile, parking on the west side of the street at Sharp Operations Center across from the Clubhouse.
THE ADDRESS: 3575 Ruffin Rd. at the Summer Hill Clubhouse.
TIME: 6:00 P.M. -???

REMEMBER TO BRING: Your potluck dish with serving utensils. Also, please bring eating utensils for yourself (plates, cups and napkins will be provided). And come ready to have fun!!



THE FESTIVUS

A publication of the San Diego Shell Club

ISSN 0738-9388

Volume: XXV | May 13, 1993 | Number: 5

MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Three Islands in Micronesia

Club members Marge and Ken Lindahl will give an illustrated presentation on their collecting trip to the Micronesian islands of Tarawa, Abemama and Abeiang in 1992.

"Copper Toxicity and Marine Embryos: Is it Reversible?"

Club Science Fair winner Nilakhom Nobouphasavanh, an 11th grader at Lincoln High School, will present an overview of his winning project and receive the Club's award.

Meeting date: May 20th
Shells of the month: Ranellidae (triton shells)

CONTENTS

CLUB NEWS

The Auction/Potluck on April 24th

The Auction/Potluck was again held at the clubhouse at Wes Farmer's condo and what a time it was! About 50 members and guests (a joy to see Twila Bratcher back) pored over the shells to be voice and silent auctioned while enjoying "Dave's Punch" and appetizers. At the dinner following, everyone did great justice to the abundance of wonderful potluck contributions. All indulged on the many goodies while greeting old friends and meeting new ones.

At 8 PM the voice auction began. There was much fun-filled and spirited bidding as Auctioneer Carole Hertz put up the lots of beautiful sale material. There was the D'Attilio drawing of *Babelomurex gemmatus*, a *Cypraea rosselli, Siratus alabaster*, a Richard Herrmann prizewinning photograph, books, and so much more.

Our thanks to the many members and friends of the Club who donated the fine auction material: Marge & Hugh Bradner, Billee Brown, Larry Buck, Anthony D'Attilio, Wes Farmer, Bob Foster, Richard Herrmann, Carole & Jules Hertz, John Jackson, June King, Kay Klaus, Marge & Ken Lindahl, Margaret & Dave Mulliner, Rick Negus, Carole Novak, Jeanne & Don Pisor, Wally Robertson, Carolyn & Bill Romer, Nancy & Bill Schneider, Don Shasky, Carol & Paul Skoglund, and Margenette Yeend.

And a deeply felt thank you to Wes Farmer who has hosted this function for the fourth time and made us all feel very welcome.

It was a fantastic party--as always the best ever!!

Come to the Bizarre Bazaar

The fourth annual shell bazaar is this Saturday May 15th beginning at 1 PM in Margaret and Dave Mulliner's garden at 5283 Vickie Drive, San Diego, 92109. Bring your shells, shell related items and a table or stand and enjoy buying, selling, trading, admiring and socializing. It's an event all members and guests enjoy--don't miss it.

For further information call Margaret Mulliner 488-2701.

Changes on the Club Board

Linda and Kim Hutsell, active club members, have relocated to Wichita, Kansas, necessitating changes in the Club board.

Margaret Mulliner has graciously agreed to fill the Treasurer's post and Pat Boyd has kindly consented to take over as Historian. Larry Buck will coordinate the Marine Field Study and Terry Arnold will chair the committee on Shells for Schools.

We wish the Hutsells well and we'll miss them.

Additions to the Roster

New members

Cronan, Sandra, PO Box 20586, Village of Oak Creek, AZ 86341. (602) 284-4383.

Guillot de Suduiraut, Emmanuel, P.O. Box 13, Central Post Office, Mandaue City, Cebu-Philippines

Hamilton, Ian, 17988 Pueblo Vista Lane, San Diego, CA 92127. (619) 674-5765.

Kronenberg, Gijs, Havenstraat 7, 5611VW Eindhoven, The Netherlands

Mons, Lynne, 245 Loma Corta Dr., Solana Beach, CA 92075. (619) 481-6046.

Reitz, Jessica, 410 Orpheus Ave., Leucadia, CA 92024. (619) 943-1029.

Waters, Charles, 308 S. Guadalupe, Redondo Beach, CA 90277. (310) 316-8214.

Woolsey, Mary Jo (Jody), 3717 Bagley Ave. #206, Los Angeles, CA 90034. (213) 839-1604.

Changes of address

Hutsell, Kim, Linda & Jeremy, 1605 W. 29th St., Topeka, KS 66611. (913) 266-6235.

Levine, Annita Tuller, c/o Barnes/Green, 10178 Myer Pl., Cupertino, CA 95014-2336.

Mendes, Eve, 6807 E. Vernon, Scottsdale, AZ 85257.

SOME UNUSUAL SHELL DAMAGE

ROLAND C. ANDERSON

The Seattle Aquarium, Pier 59, Waterfront Park,
Seattle, Washington 98101

There are a number of factors that contribute to the damage, destruction, and decomposition of shells. I'm sure we're all familiar with some of the usual causes of shell damage: physical abrasion by waves rolling a shell on the shore; damage by rubbing against rocks, sand, gravel, or coral; damage from being eaten by fish or other invertebrates; damage from harvest by people; damage from the collecting process; and damage as part of the natural life cycle of the animal (such as is evident in species of *Caecum*). Shell collectors will be familiar with Byne's Disease, a condition that affects shells housed in collections; since Byne's disease is an unnatural disease, I won't discuss it here. I'll describe other, lesser-known aspects of natural shell damage.

Natural shell damage is important to the study of taphonomy, which looks at how the environment affects living and dead materials. Such information helps us understand past environments by comparing what happens in living organisms to what we see in the fossil record.

Several species of sponges damage shells. Hermit crab sponges, species of *Suberites*, dissolve the shells they encrust. *Suberites domuncula* is the common species on the northern West Coast and *S. suberea* occurs from California southward (Austin, 1985).

I first noticed these sponges while diving on Cerantes Rocks (Port San Juan, B.C.). They were on solid rock, about fifty feet deep and were a deep, red-orange color. Most of them were oval in shape and slightly flattened from top to bottom. They were about two inches across. When I looked at them closer, I noticed that they were moving. At first I thought they were moving in the surge caused by the swells on the surface; I was moving back-and-forth across the bottom with each wave. On closer examination, I saw that each sponge was occupied by a hermit crab, which was moving the sponge. I collected some to take back to the Seattle Aquarium, where they survived well (Figure 1).

Suberites is a wide-spread genus, found in the North Pacific and North Atlantic (Austin, 1985; Smith, 1964). Throughout its range, members of this genus are known to live in a commensal relationship with hermit crabs. On the Pacific Coast, *S. suberea* and *S. domuncula* live on shells inhabited by *Pagurus stevensae* (Hart, 1982), although other species of hermits may inherit the sponge if the original inhabitant dies or is forced out. In addition to Cerantes Rocks, I have found these sponges in Washington at Neah Bay and in the San Juan Islands.

The hermit crab originally occupies a snail shell just like any other hermit crab. The sponge somehow settles onto the shell. It is not known if sponge larvae actively seek out hermit crab shells, possibly by smell ("eau de hermit crab?"), or perhaps sponge larvae that settle on hermit crabs are the only ones that survive. It is also possible that hermit crabs may actively seek out the sponge and place it on their shells, like other species of hermit crabs place anemones on their shells (Zann, 1980). *Suberites* spp also live encrusting on rocks, so this is a possibility.

The snail shell is eventually dissolved, and the hermit crab eventually ends up living in a hole in a mass of sponge (Figure 2). It has always been assumed that the sponge actively dissolves the shell by use of some chemical secretion (MacGinitie and MacGinitie, 1968), but this action has never been studied and substantiated.

The hermit crab-sponge relationship is a case of true commensalism, where both partners benefit. The sponge gets moved around to new feeding areas and may derive a better oxygen supply. It also avoids sponge predators such as nudibranchs and sea stars by being moved by the hermit crab. The hermit crab also derives protection from predators,

Figure 1. The snail shell shape is still visible in this hermit crab sponge. The shell may have been *Nucella lamellosa* (Gmelin, 1791).

Figure 2. The snail shell shape is eventually lost as the shell is dissolved and the sponge grows.

as the sponge is noxious to most crab predators. Suitable shells for hermit crabs are frequently limited (Kozloff, 1983), so the hermit crab also gains a home.

MacGinitie and MacGinitie (1968) suggest that in France, *S. ficus* eventually grows too large for the hermit crab to carry around. The hermit crab drops the sponge and it then attaches to rocks, where it continues to grow. Therefore, the hermit crab may serve as a source of dispersion for the sedentary form of this species of sponge.

The taxonomy of *Suberites* spp is still in flux. West Coast species have been called *S. ficus, S. latus, S. suberea* and *S. domuncula*. Austin and Ott (1987) call one species "*S. ?suberea* forma *latus* Lambe, 1893," which shows the confusion over the species. Further investigation is obviously indicated.

A different kind of sponge, the boring sponge (*Cliona* spp) is one of the most important shell decomposers. If it weren't for *Cliona* we would probably be knee-deep in empty shells, on shores and underwater (although this would probably be shellers' heaven!). *Cliona* bore into shells, living and dead, and in living and dead stony corals. They also frequently live in rock crevices. The genus is cosmopolitan, with representatives living in all seas. They are usually bright sulfur-yellow. An infected shell will appear to be riddled with tiny yellow bumps, as the sponge protrudes slightly from its burrows. Dried shells that have been sponge-infested appear to be peppered with tiny round holes, 0.1-1.0 mm in diameter. The common boring sponge on the West Coast is *Cliona celata* (Austin and Ott, 1987).

Cliona bore into shells by a combination of chemical and mechanical erosion (Zann, 1980).

Special sponge cells settle onto the calcium carbonate of a shell and chemically etch out a chip of shell the same size as the cell by extruding a shell-dissolving substance around the rim of the cell. Then, special transport cells carry the chip away to where it can be expelled out an ex-current pore.

While much of the sponges' boring occurs in dead shells, many live shells are also infested, particularly the shells of abalone (*Haliotis* spp.), rock scallops (*Crassadoma gigantea*) (Figures 3 & 4), giant barnacles (*Balanus nubilus*), and corals. When the sponge bores completely through these living shells, the host must mount a defense against it, and lays down an extra layer of shell where the sponge has penetrated. This is an extra energy drain on the host, which may weaken or kill it. To the effect that the sponge is harming these living animals, it is a true parasite on them. In the case of coral, Zann (1980) estimates that one third of the bio-erosion of coral reefs is due to *Cliona*.

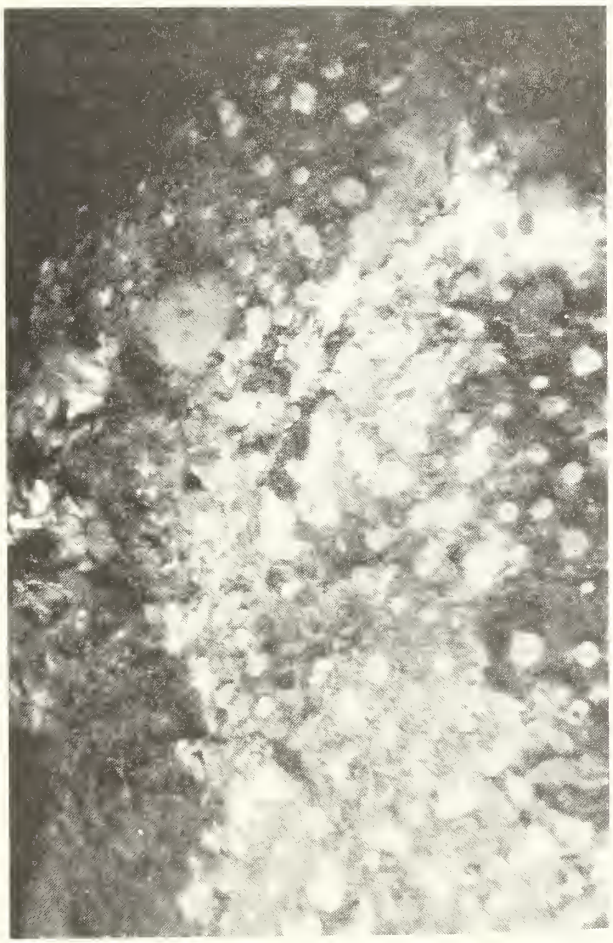


Figure 3. The surface of this live *Crassadoma gigantea* (Gray, 1825) is dimpled by an infestation of *Cliona*.

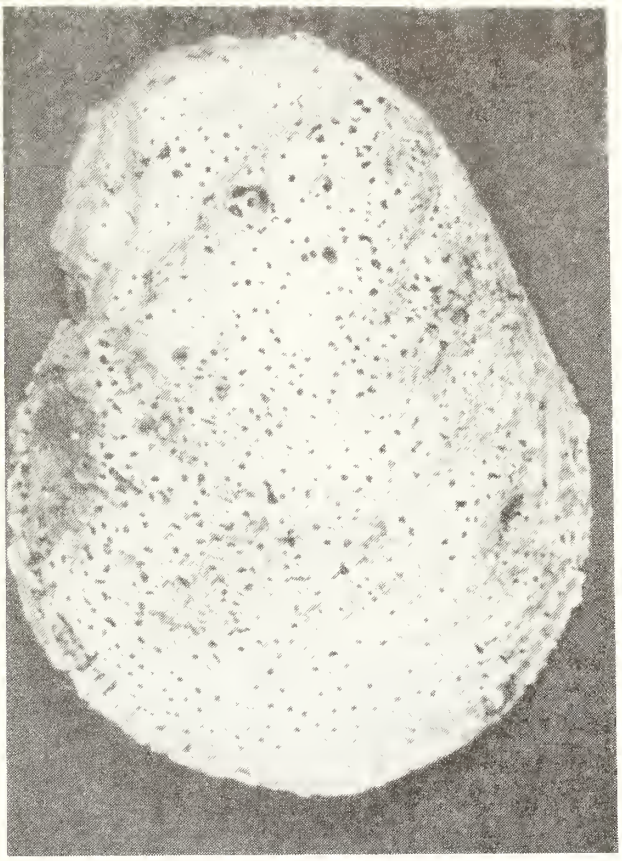


Figure 4. Cleaned shells, such as this *Crassadoma gigantea* that have been infested with *Cliona* may appear pock-marked by the sponge's burrows.

Cliona grow extensively on rocks other than coral reefs or coral rocks. I have seen them growing profusely on basaltic rock in the fjords of the Pacific Northwest. They are usually growing in cracks of these rocks. It is not known if the sponges contribute to the erosion of under-water rocks. This would be a likely possibility in limestone rock.

The family name for these boring sponges, Clionidae, is shared and preempted by the older family name of swimming opisthobranchs, also Clionidae (Austin and Ott, 1987). Obviously, further taxonomic work is suggested.

Some shells may have holes drilled in them by other mollusks. Most of these are caused by marine boring snails, but it is not so well-known that octopus can drill shells.

Octopus have a small radula which they use to

drill into molluscan shells (Wodinsky, 1973), in conjunction with an accessory organ that chemically dissolves the shell (Nixon, 1980). After they drill a small hole in the shell, they "spit" in a bit of toxic saliva, which relaxes, paralyses, and kills the prey. (This is the same type of venom that kills people bitten by the blue-ringed octopus; all octopuses are venomous to varying degrees, but all bites are not envenomated.) Once the prey is relaxed and paralysed, the octopus then opens it with ease for feeding.

Holes in shells drilled by octopus look similar to those drilled by snails. The holes are usually very small. A hole drilled in a clam by a 7.5 kg *Octopus dofleini* at The Seattle Aquarium measured just 2 mm across (Figure 5--note that the hole is oblong). The hole just barely penetrated the shell. For a detailed description of octopus hole-drilling behavior see such literature as Arnold and Arnold (1969).

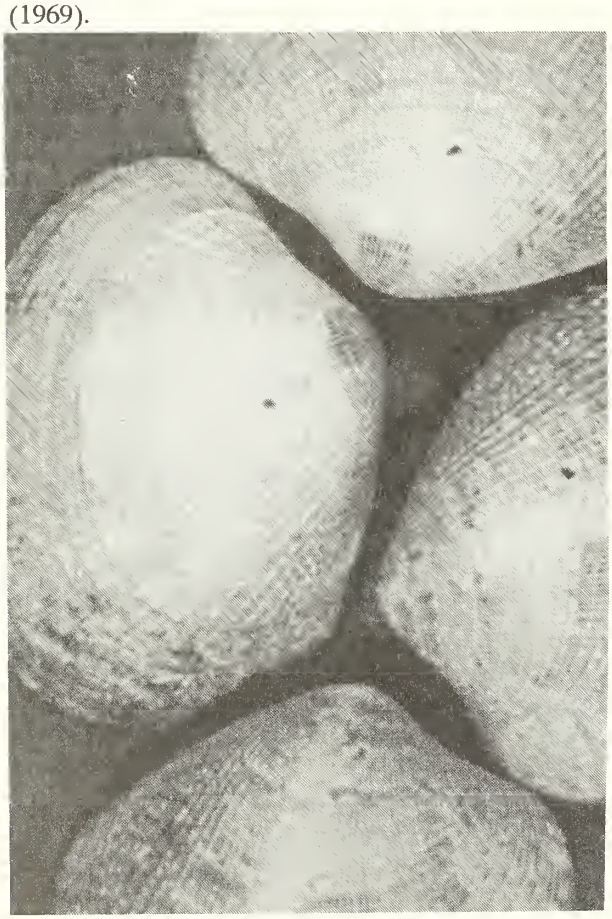


Figure 5. Shells of *Tapes philippinarum* (Adams & Reeve, 1850) that were drilled by a 7.5 kg *Octopus dofleini* (Wülker, 1910).

A very different type of shell damage is commonly found on the Kennerley's Venus clam, *Humilaria kennerleyi* (Reeve, 1863). I have found Kennerley's Venus in Puget Sound (Washington State) in areas swept by moderate current, buried shallowly in gravel or lying on the surface of the substrate. It grows to about 10 cm in length and has an oval shell with sharp concentric ridges. The thick shell is gray and has a texture somewhat like cement. The shell damage that is commonly seen on living and dead shells is delamination of the shell layers around the edges of the shell. This damage is caused by sea stars attempting to prey on the clam.

Kennerley's Venus is resistant to being fed upon by most sea stars. The large sunflower star (*Pycnopodia helianthoides*) digs up these clams from several inches deep in the gravel, ingests them, and "spits" them out unopened and unharmed several days later; these "Jonahs" are the clams that are found just lying on the gravel. Many sea stars attempt to open this clam but are unsuccessful, due to the clams' strong adductor muscles, tight-fitting shell and the fact that the edges of the shell break away before the clam is opened (see Anderson, 1985). There only a few sea stars persistent enough to open *Humilaria* namely *Pisaster brevispinus* and *Orthasterias koehleri* (Mauzey, et al, 1968). They may attempt to open one clam for up to a week, breaking away pieces of shell until an opening is effected.

During recent years, I have been doing some diving in Lake Crescent (Olympic Peninsula, Washington State), where I have seen another unusual type of shell damage. Lake Crescent is a clear blue lake, with underwater visibility reaching a hundred feet at times. It is nestled in the mountains of Olympic National Park. It has steep rocky sides, sloping down to 600 feet deep. There are areas of mud and sand in between the rock outcrops where I have seen numerous freshwater mussels, *Anodonta kennerlyi* Lea, 1860, whose shells were badly eroded (Figure 6).

Almost all of the shells of large *Anodonta* I see in this lake are pitted and eroded. There are different stages of the erosion, depending on the size of the mussel; smaller mussels are unblemished, medium-sized ones are slightly eroded, and large ones are greatly eroded. There are few empty shells lying about, and these are the most eroded of all.

Figure 6. The shells of these *Anodonta kennerlyi* from Lake Crescent, Washington state are very erose.

Also, the mussel shells protruding out of the substrate are more eroded than those buried. The substrate where these are living is very soft mud. Those mussels living in the mud still have the tips of the shells protruding so their siphonal areas have access to open water.

There are several reasons these shells can be become eroded. Anoxic conditions in the mud may contribute to the shell damage. Anoxic conditions produce hydrogen sulfide, which in conjunction with iron in sediments produces sulfurous acid on contact with water (Hutchinson, 1975), which is corrosive to shell material. However, since the shell parts buried in the mud were less eroded than the parts exposed, this is not a likely possibility.

Another contributing factor may be the acidity/alkalinity of lake water. Most ocean waters are slightly alkaline, with a pH of 7.5-8.4 (Sverdrup et al, 1942). Anodontidae are rarely found in waters with a pH below 7.0 (Pennak, 1978). The pH of a water sample I took from Lake Crescent was 7.8, not particularly low. It does not seem likely that low pH conditions are responsible for the shell damage.

Another factor that might be responsible is soft water conditions. Soft drinking water has been known to erode pipes in public water systems, and could dissolve shell material. A water sample from Lake Crescent that was tested for hardness showed dissolved solids of 58 mg/l, indicating soft water, so this is a likely reason for the shell erosion.

This shell erosion could eventually kill the mussels. Some of the live mussels I collected had very thin shells in the spots of erosion, which broke easily. Pennak (1978) says some Anodontidae may live up to 10 or 15 years. It would be interesting to tag some of these mussels and follow them for several years to determine their life span and if shell erosion contributes to their death.

ACKNOWLEDGMENTS

I thank C. Clifton Coney of the Los Angeles County Museum of Natural History and Elsie Marshall of the Burke Museum for identifying shells mentioned in this article. I also thank Leo Shaw of the Seattle Aquarium for photographing the shells.

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ADDITIONAL DISTRIBUTIONAL INFORMATION FOR *COCHLIOLEPIS CORNIS* HERTZ, MYERS & GEMMELL, 1992 (GASTROPODA: VITRINELLIDAE)

CAROL SKOGLUND

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, California 93105

Cochliolepis cornis Hertz, Myers & Gemmell, 1992 was described with a distribution from San Felipe to just south of Puertecitos, Baja California, Mexico. Two lots in the Skoglund collection extend the distribution across the upper Gulf of California, and south to Nayarit, Mexico.

One lot of two shells was collected by me in the drift at the high tide line at Estero Morua (31°17'N; 113°26'W) which is about 4 miles southeast of Puerto Peñasco, Sonora, Mexico. A second lot of three shells was dredged by Peter and Sally Bennett off Playa Novillero, Nayarit, Mexico (22°23'N; 105°45'W) at a depth of 7 to 15 m.

I thank Carole Hertz, who identified the shells by comparing them with a paratype.

LITERATURE CITED

HERTZ, C.M., B.W. MYERS & J. GEMMELL
1992. Two new vitrinellid species from the Gulf of California, Mexico (Gastropoda: Vitrinellidae). The Veliger 35(1):70-73, figs. 1-8 (Jan. 2).

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Abalone Gametes or How *Haliotis* Make Babies

Dr. Victor D. Vacquier, professor of marine biology at Scripps Institution of Oceanography, has been researching fertilization in the roughly 80 worldwide *Haliotis* species.

He will present an illustrated program on this very interesting subject.

Meeting date: June 17th
Shells of the month: Abalone

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - May 20, 1993

The meeting was called to order by Vice President Hugh Bradner. After the minutes were accepted and several announcements made, Hugh introduced the Club's 1993 Science Fair winner, Nilakhom Nobuphasavanh, an 11th grader from Linclon High School. Nilakhom made a short presentation on his project, "Copper Toxicity and Marine Embryos: Is it Reversible?" This project focused on determining the length of time urchin embryos can be exposed to levels of copper currently present in San Diego Bay before irreversible damage is done. The embryos were exposed to copper concentrations in the 1000 ppm for time periods ranging from a few minutes to 3+ hours. Then the copper was removed by addition of EDTA, a mild chelate. This chelate has been proposed as an alternative method of removing some of the heavy metal concentrations in San Diego Bay. He concluded that irreversible effects of high copper concentrations were rapid and that EDTA may not be cost effective except in special circumstances.

After his presentation, Nilakhom was awarded his prize of a copy of Barnes' **Invertebrate Zoology**.

Hugh then introduced the main speakers, Ken and Marge Lindahl who presented slides on their trip to Kiribati, also known as the Gilbert Islands. The slides showed island life and reef scenes on the islands of Tarawa, Majuro, Abe Mama and Abe Ing. The slides of the available"hotel" accommodations lends credence to the reports of marginal facilities on these remote islands. Accompanying the presentation was an extensive display of native crafts from Kiribati supplied by the Lindahls and the Bradners.

The door prize was won by Arthur Yeend. Four special door prizes from Kiribati contributed by the Bradners and the Lindahls were won by Terry Arnold, Louis Deschaine, Delbert Foss and Bruce Kemp.

Terry Arnold

The Clipperton Expedition - 1994

A research expedition to Clipperton Island in the eastern Pacific focusing on underwater marine faunas is planned for April 7 through May 7, 1994, with possible options for "late fly-down departure and early fly-back return."

The trip will depart from and return to San Diego, California and will be aboard the M/V "Royal Star," a 92-foot long-range sportfishing boat which will be equipped to handle SCUBA diving. Stops will be made at Rocas Alijos and the Islas Revillagigedo.

There will be space for a total of 18 people on this trip to isolated Clippertion Island, an "overlap" zone containing both tropical eastern Pacific and Indo-Pacific faunal elements. If you are interested in exploring this very poorly known area on the Clipperton Expedition 1994, contact John Jackson for further information by phone at (619) 570-8405 or FAX (619) 579-7901, or write to him at 11558 Rolling Hills Dr., El Cajon, CA 92020.

The Western Society of Malacologists Meets in San Diego this June

The 26th annual meeting of the Western Society of Malacologists (WSM) will be held at the La Jolla Radisson Hotel from June 27 to July 1, 1993.

There will be two symposia "Contemporary Research on Mollusca" and "Malacofauna of Western Mexico" in addition to contributed papers, a special "Photography of Mollusks" poster session and exhibits. In addition there will be an opening reception, evening slide shows, an auction and reprint sale (with a wine and cheese reception hosted by the San Diego Shell Club), and banquet featuring a presentation by Dr. Barry Wilson of Western Australia.

Club members are urged to attend the WSM annual meeting. It is an opportunity to meet those professionals and amateurs active in the field and hear about their latest research.

DWARFISM AND MELANISM IN *PTEROPURPURA TRIALATA* (SOWERBY,1834) AT AGUA HEDIONDA LAGOON, CARLSBAD, CALIFORNIA

RICHARD NEGUS
3401 Woodland Way, Carlsbad, CA 92008

I became aware of these very unusual Murex shortly after moving here from Los Angeles County in the summer of 1987. The mid-summer low tides being in the -1.5 to -1.7 foot range, exposed a large portion of the riprap and muddy sand around the periphery of the lagoon. The shells in question were found on the rocks, trestles and buried in the mud at the base of rocks, all exposed above the water. This occurrence is very unusual for *P. trialata* as they are normally found at a depth of 20-40 feet farther north in Los Angeles County, which is the center of their range. Of the 50+ specimens that I have observed at the lagoon there appear to be four distinct variants that are different from the normal *P. trialata* that we see from deeper water (Figure 1), and the four varieties figured here show the same amount of dwarfism. I have not measured a specimen larger than the very heavy and gerontic 65 mm specimen (Figure 2) and the majority of the shells I found were well under 55 mm. McLean (1978) gives the size range for *P. trialata* as 55-80 mm and Glass & Foster (1982) mention finding specimens to 97 mm in 10-30 feet of water. The smallest size they reported is the maximum size for those varieties found at Agua Hedionda. Radwin & D'Attilio (1976) describe the shell as being large (to 93 mm) and having one and one-half nuclear whorls and seven or eight weakly shouldered teleoconch whorls. These dwarf specimens all have between seven and eight teleoconch whorls even those specimens 44 mm in length, so they are not just immature *P. trialata.*

The first variety is a remarkable looking shell; it is melanistic in the extreme, reminiscent of the *Cypraea* found on New Caledonia. Specimens were found that are extremely dark brown and

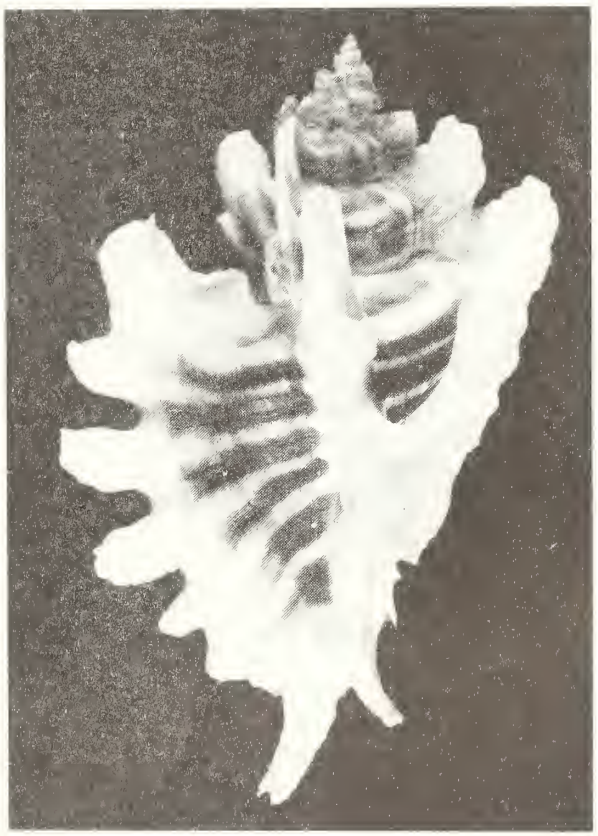

Figure 1. *Pteropurpura trialata*, an 87 mm specimen from Los Angeles California. Photo: D. K. Mulliner.

completely lacking in bands of any kind (Figure 3) or with just a hint of dark brown bands coming through (Figure 4). What could have been the cause of the melanism in this population of *P. trialata*? The possible explanations for these unusual specimens are many. Charlie Waters (pers. comm.) who has collected many *P. trialata* as well as the albino form of *P. trialata* in Los Angeles

Figure 2. *P. trialata*, a gerontic 65 mm specimen. Photo: D. K. Mulliner.

Figure 3. *P. trialata*, a 50 mm specimen lacking any bands. Photo: D. K. Mulliner.

Harbor at 20-40 feet, suggests that being exposed at low tide to sunlight and ultraviolet radiation has stimulated the dark color. Other possible causes might be pollution, diet or disease, but regardless of the reasons, the subject is beyond the scope of this paper.

The second variety (Figure 5) is very similar to the albino form of *P. trialata* (Figure 6) but with a dark blue-brown stain inside the shell (Figure 7) which shows up as a bluish color on the outside of the shell. This coloring is seen in some normal albino *P. trialata* but only on the early whorls (Figure 6), not over the whole shell like these dwarf specimens. There is also a distinct bluish-brown staining on the ends of the siphonal canal (Figure 8) that is not found on a normal *P. trialata* form *alba*.

The third variety (Figure 9) is very rare and possibly just represents geriatric specimens that have been faded or bleached by the sun or pollution. The shell has the same pattern as the first variety, but the color is a very bleached looking light tan color.

A fourth variety is similar to the normal *P. trialata* shown in Figure 1 in that it has bands on its body and varices but resembles the variety shown in Figure 4 in its dwarfism, shape of varices and brown bands.

ACKNOWLEDGMENTS

I would like to thank Dave Mulliner for photographing these shells, and Charlie Waters for his generous input.

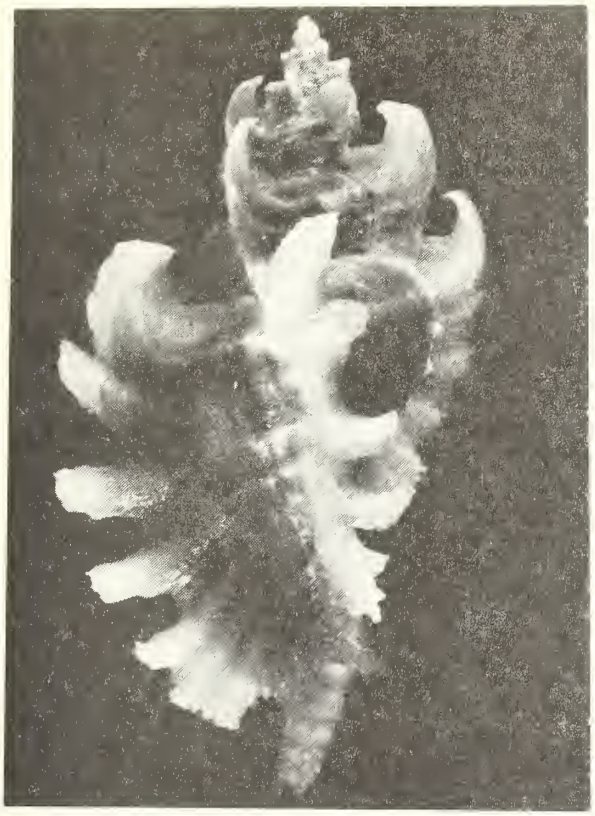

Figure 4. *P. trialata*, a 57 mm specimen with a hint of brown bands. Photo: D. K. Mulliner.

Figure 5. *P. trialata*, a 64 mm white shell with bluish/brown stain on whorls of shell and tip of canal. Photo: D. K. Mulliner.

Figure 6. *P. trialata*, an 83 mm all white form, the form more usually found. Photo: D. K. Mulliner.

Figure 7. Detail of interior of aperture of specimen shown in Figure 5, showing bluish/brown color. Photo: D. K. Mulliner.

Figure 8. Detail of canal of specimen in Figure 5 showing bluish/brown stain. Photo: D. K. Mulliner.

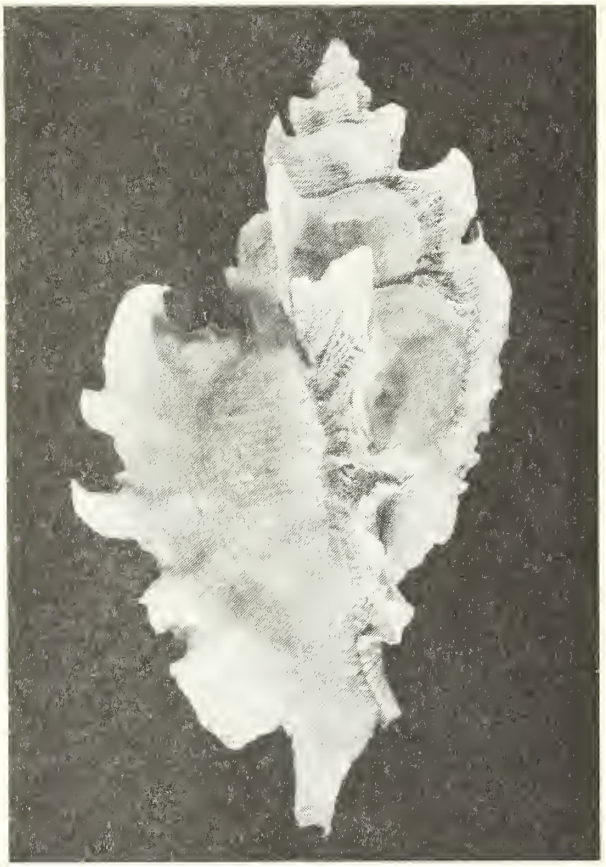

Figure 9. *P. trialata*, a 61 mm faded- appearing shell, possibly a gerontic specimen. Photo: D. K. Mulliner.

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1982. California seashells part II: *Pteropurpura* (Muricidae) Conchologists of America Bulletin 10(4): 10-13.

McLEAN, JAMES H.
1978. Marine Shells of Southern California, Revised Edition. Natural History Museum of Los Angeles County, Science Series 24: 1-104.

RADWIN, GEORGE E. & ANTHONY D'ATTILIO
1976. Murex Shells of the World an illustrated guide to the Muricidae Stanford Univ. Press., Stanford, CA. pp. 1-284.

PTEROPURPURA TRIALATA (SOWERBY, 1834): FEEDING OBSERVATIONS

LARRY BUCK
2411 El Amigo Road, Del Mar, California 92014

Several years ago I had tried - unsuccessfully - to keep *Pteropurpura trialata* in my salt water aquarium for an extended period of time. Although other muricids in the aquarium fed readily on various bivalves and other food items, I was not successful in enticing the *P. trialata* to feed. They seemed to slowly become emaciated and after awhile died, even though remaining fairly active until the end. Since then I've moved and dismantled my aquarium.

I searched through the available literature and was unable to find what *P. trialata* feed on. John LaGrange, fellow diver and Club member, said he thought they might be feeding on tube worms (actually mollusks). I kept my eyes peeled when diving, but failed to confirm John's hunch even after many hours of observing *P. trialata* .

Recently, while scuba diving near a local breakwater - a common habitat of *P. trialata* - I observed a specimen clinging to a clump of *Serpulorbis squamigerus* (Carpenter, 1857) at a depth of 10-15 feet. When I lifted the *P. trialata* I noticed it had 2-3 inches of its proboscis inserted down a tube of *S. squamigerus*. The animal was obviously feeding. Thus I feel I finally confirmed at least one of the prey species (food items) of *P. trialata*. At several locations where we find *P. trialata* to be common - usually on rocks at 5-25 feet - there also are abundant *S. squamigerus* attached to the rocks.

I hope I've solved the mystery of what to feed captive *P. trialata*. *Serpulorbis squamigerus* are very plentiful in our local bays at low tide and at shallow diving depths. I can't wait now to set up my aquarium again. Maybe I can raise a world record sized *P. trialata*.

CORRECTION TO A PANAMIC CAECID IDENTIFICATION

JULES HERTZ
3883 Mt. Blackburn Avenue, San Diego, California

It has been brought to my attention by Carol Skoglund that I misidentified the caecid figured in the article entitled "Minute Shells" in **The Festivus** (1978, vol. 10(1):91, 2 figs.). The shell figured is *Caecum liratocinctum* Carpenter, 1857, not *C. elongatum* Carpenter, 1857 as written. Carpenter stated that *C. elongatum* "seem to have relations with *C. liratocinctum*, but show no trace of longitudinal ribs." The specimens figured have some traces of longitudinal ribs.

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The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Shell Remains in Archaeology

Susan Hector and Martin Rosen, husband and wife, have been anthropologists for about 20 years. They will present this slide program, with a display, on shell remains in southern California. Susan is with Parks & Recreation and Martin is with Caltrans.

Meeting date: July 15th
Shells of the month: fossils

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - June 16, 1993

The meeting was called to order by President Carole Hertz. After introduction of guests and acceptance of the minutes as published in **The Festivus**, there were several announcements.

The September party, a luau will be held at the Catarius' garden on Saturday evening, the 18th -- menus and details at the August meeting.

Dave Mulliner gave information on the upcoming annual meeting of the Western Society of Malacologists to be held here from June 27th to July 1. The Club will host a reception prior to the auction on June 29th to which all members are invited. Members were asked to donate any duplicate reprints to George Kennedy for the WSM reprint sale to be held concurrently with the auction.

Following these announcements, Hugh Bradner introduced our speaker for the evening, Dr. Victor D. Vacquier of Scripps Institution of Oceanography who gave an exciting presentation entitled, "Abalone Gametes or How *Haliotis* Make Babies."

Dr. Vacquier has been at the forefront of research on fertilization, studying the molluscan group *Haliotis*. He explained that invertebrates such as abalone or sea urchins serve exceptionally well for this research since they are readily available and large quantities of eggs and sperm can be collected for laboratory study.

Dr. Vacquier shared with us his as yet unpublished findings. He illustrated with drawings and slides how abalone sperm show species specificity and attach to the protective casing of the egg of the same species. Once attached, the sperm releases a protein which disperses the fibers of the protective casing in the area of attachment. No enzyme is involved. The sperm is then drawn in by the egg.

Dr. Vacquier's laboratory has done DNA analysis of the different west coast species of *Haliotis* as well as that of some additional worldwide species. He has been able to study the relationships and relative ages of worldwide species.

Following his presentation, he spent at least a half-hour answering the many questions from the very interested audience

Ron McPeak won the shell drawing and the delicious refreshments for the social time following the meeting were provided by Kay and Del Klaus.

Additions to the Roster

Lance, James R., 746 Agate St., San Diego, CA 92109. 488-2132.

Small, Michael, Embajada de Canadá, Apartado postal 10303-1000, San José, Costa Rica. 506-28-96-34.

Change of address

Bertsch, Hans, 192 Imperial Beach Blvd. #A, Imperial Beach, CA 91932.

Club Mugs and Pins Available

Club mugs each featuring three local shells, *Pteropurpura trialata, Cypraea spadicea* and *Haliotis rufescens* and the Club logo are available in two sizes, standard at $7 and extra-large at $9 each. Add $2 for domestic postage, when necessary. For overseas orders, postage will vary depending on the country.

San Diego Shell Club pins are still available for sale at $3 each plus 50¢ postage (domestic), when necessary. To order, contact Margaret Mulliner at 5283 Vickie Dr., San Diego, CA 92109, USA or call 619-488-2701.

Mark Your Calendars Now for the Club's Christmas Party

The 1993 Club Christmas party will be held on Saturday evening, December 4th. There will be a Mexican theme. Further details later.

GEOGRAPHIC LOCATIONS SUPPLEMENTING "ADDITIONS TO THE PANAMIC PROVINCE GASTROPOD (MOLLUSCA) LITERATURE - 1971-1992" BY CAROL SKOGLUND

ROBERT KOCH
Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105

In the Skoglund gastropod supplement to Keen (1971) [**The Festivus**, Volume XXIV (Supplement) 1992], geographic references were cited that were not in A. Myra Keen's (1971) "**Sea Shells of Tropical West America**," 2nd edition, Stanford University Press. The following is intended to update the Keen (1971) section titled "Geographic Aids."

Numbers to the right correspond to those contained on the maps on pp. 929-932 in Keen. There is some duplication between this list and that of Keen. It has been done for convenience so that only one reference need be consulted. The geographic limits are those proposed by Keen and followed by Skoglund.

A list of Spanish-English equivalents for some geographic features is contained in Keen (pp. 919-920). Two additional equivalents should be noted: arroyo = wash and canal = channel.

Locations in Mexico

Cited Mexican states (with abbreviations)

Baja California "Norte" (B.C.)	23-29
Baja California Sur (B.C.S.)	5-22
Sonora (Son.)	30-42
Sinaloa (Sin.)	43-46
Nayarit (Nay.)	47-49
Jalisco (Jal.)	49-51
Colima (Col.)	52
Michoacán (Mich.)	53
Guerrero (Gro.)	53-55
Oaxaca (Oax.)	56-59
Chiapas (Chis.)	60-61

Abreojos = Punta Abreojos, B.C. (beyond Panamic limits) 3
Acapulco = Acapulco, Gro. 54
Adair = Bahía de Adair, Son. 30
Agiabampo = Laguna (Estero) de Agiabampo, Son. & Sin. between 42 & 43
Angel = Puerto Angel, Oax. 57
Angeles = Bahía de los Angeles, B.C. 23
Angeles, Caleta de los (see Tenacatita)
Antonio, Punta San (see Guaymas)
Arena = Arena Bank & Punta Arena, B.C.S. north of 9
Augustín = San Augustín, Son. between 38 & 39
Bacochibampo, Bahía (Ensenada) de (see Guaymas)
Balandra, Bahía (de) (see La Paz)
Ballena, Isla (see Espiritu Santo)
Banderas = Bahía de (las) Banderas, Nay. & Jal. 49
Adjacent locales: Punta Mita, Nay.; La Cruz (de Huanacaxtle), Nay.; & Cabo Corrientes, Jal.
Benito, Isla(s) San (see Cedros)
Blas = San Blas, Nay. 48
Buenavista = "Rancho Buenavista" (Buena Vista), B.C.S. north of 9
Adjacent locale: La Ribera
Cachori, Playa (see Guaymas)
California = Golfo de California 9-46
Carizal, Bahía (de) (see Manzanillo)
Carlos, San & Bahía (de) (see Guaymas)
Carmen = Isla Carmen, Golfo de California 15
Cedros = Isla Cedros, B.C. (beyond Panamic limits) 1
Adjacent locale: Isla(s) San Benito
Cerralvo = Isla Cerralvo, Golfo de California 10

Chale = Agua (de) Chale, B.C. between 28 & 29
Chamela = Bahía (de) Chamela, Jal. 50
Chilenos = ("Los Chilenos")
Bahía Chileno, B.C.S. between 7 & 8
Cholla, Bahía la (see Peñasco) southernmost part of Bahía de Adair
Chollude = Isla el Chollude, Golfo de California 28
Clara = (Village of) El Golfo de Santa Clara, Son. between 29 & 30
Clarión, Isla (see Revillagigedo)
Colonet = Cabo Colonet, B.C. (beyond Panamic limits)
Colorado = Morro Colorado, Son. between 37 & 38
Concepción = Bahía (de) Concepción, B.C.S. 18
Conejo = Arroyo Conejo, B.C.S. between 5 & 6
Coronados = Islas (de los) Coronados, B.C. (beyond Panamic limits)
Corrientes, (Cabo) (see Banderas)
Cristóbal = Bahía (de) San Cristóbal, B.C.S. (beyond Panamic limits) ca 2
Cuastecomate = Bahía (de) Cuastecomate, Jal. 51
Danzante = Isla Danzante, Golfo de California 14
Ensenada = Ensenada, B.C. (beyond Panamic limits)
Adjacent locales: Isla(s) & Bahía de Todos Santos
Escondido = Puerto Escondido, B.C.S. & Bahía (de) Escondido 14
Espirítu Santo = Isla Espíritu Santo, Golfo de California 11
Adjacent locales: Isla Ballena & Isla Partida (Another island by the latter name is in the upper Gulf.)
Estrella = Punta Estrella, B.C. south of 29
Felipe = San Felipe, B.C. & Bahía de & Punta San Felipe 29
Final, Punta (see Gonzaga)
Frailes = Los Frailes, B.C.S. ca 9
Francisquito = Bahía (Ensenada) (de) San Francisquito, B.C. between 21 & 22
Gonzaga = Bahía (de) San Luis Gonzaga, B.C. 26
Adjacent locale = Punta Final
Gorda = Gorda Banks (off B.C.S.) between 8 & 9
Guadalupe = Isla Guadalupe, B.C. (beyond Panamic limits)
Guarda = Isla Angel de la Guarda, Golfo de California 24
Guaymas = Guaymas, Son. & Bahía de Guaymas 41
Adjacent locales (all part of the greater Guaymas area): Punta San Antonio, San Carlos & Bahía (de), Caleta Saladita, Bahía de Bacochibampo, Cabo Haro & Playa Cachori
Haro, Cabo (see Guaymas)
Hipólito = Punta San Hipólito, B.C.S. (beyond Panamic limits) between 2 & 3
Huanacaxtle, La Cruz de (see Banderas)
Ignacio = Laguna (de) San Ignacio, B.C.S. (beyond Panamic limits) between 3 & 4
Isabel(a) = Isla Isabel(a) (off coast of Nay.) (a.k.a. Isla María Isabelita) between 47 & 48
Jaltemba = Bahía (de) Jaltemba, Nay. between 48 & 49
José = Isla San José, Golfo de California 12
Kino = Bahía Kino, Son. 36
La Paz, B.C.S. & Bahía de La Paz ca 11
Adjacent locale: Bahía de Balandra (not [10] as shown in Keen)
Lobos, Puerto (see Tepoca)
Lucas = Cabo San Lucas, B.C.S. 7
Adjacent locale: Playa San Ramón
Macapule = Isla Macapule (off coast of Sin.) between 43 & 44
Magdalena = Bahía (de) Magdalena, B.C.S. 5
Adjacent locale: Bahía (de) Santa María
Manzanillo = Manzanillo, Col. 52
Adjacent locales: Bahía (de) Santiago & Bahía (de) Carizal
Marcos = Isla San Marcos, Golfo de California between 20 & 21
María = Bahía (de) Santa María (see Magdalena)
Marías = Islas Tres Marías (off coast of Nay.) 47
Martír = Isla San Pedro Martír, Golfo de California 37
Matenchén = Bahía (Ensenada) Matenchén, Nay. between 48 & 49
Mazatlán = Mazatlán, Sin. 46
Mita = Punta Mita, Nay. (see Banderas)
Monserrate = Isla Monserrate, Golfo de California ca 13
Morua, Estero (see Peñasco)
Muertos = Bahía de los Muertos, B.C.S. between 9 & 10
Mulegé = Mulegé, B.C.S. 19
Navidad = Barra de Navidad, Jal. ca 51
Nolasco = Isla San Pedro Nolasco, Golfo de California 38
Novillero = Playa Novillero, Nay. between 46 & 47

Canas = "Canas" = Cancas	ca 114
Colorado = Tierra Colorado	between 113 & 114
Cruz = Caleta la Cruz	between 111 & 112
Máncora = (Puerto) (Ensenada de) Máncora	113
Paita = (Puerto) Paita	115
Pimental = Pimental (beyond Panamic limits)	between 118 & 119
Pizarro = Puerto Pizarro	between 111 & 112
Tumbes = Tumbes	111
Zorrites = (Puerto) Zorrites	112

(Other locations cited in Peru are beyond Panamic limits and lack map numbers.)

HOW AN IDA'S MITER TOOK UP BALLOONING AND LANDED ON THE BEACH

WESLEY M. FARMER
3591 Ruffin Road #226, San Diego, California 92123

An Ida's Miter, *Mitra idae* Melvill, 1893, with the help of the Bath Towel Alga, *Gigartina,* did just that (Figure 1). The shell, 48 mm in length, with some wear to the periostracum, was occupied by a hermit crab, *Pagurus,* at the time of this unusual transport.

My friend Lynne and I were jogging on the beach, careful not to step on the kelp and other algae stranded by the ebbing tide. There were also bean clams, jingle shells and occasional piddocks.

After a bite to eat, the walk and jog to the car gave us time to explore the beach. A Bath Towel Alga with its holdfast attached to something relatively small caught my eye. It was a full-grown *Mitra idae* with hermit crab upon which the alga must have started to grow. It would seem that as the alga grew the hermit crab went about what hermit crabs do until the the growth of the alga must have reached the point at which the hermit crab, with its four pair of walking legs and a pair of chelipeds, could no longer keep the shell down and the alga began ballooning with its shell. The ocean currents caught the threesome and cast them up on the beach where the ebbing waves left them to be discovered by this biologist.

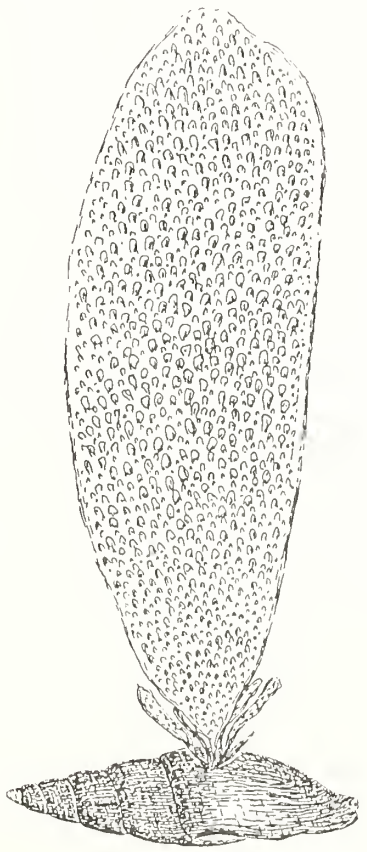

Figure 1. *Mitra idae* with attached *Gigartina.*

GLYPTOSTOMA NEWBERRYANUM, THE SAN DIEGO CHESTNUT

CAROLE M. HERTZ
Department of Marine Invertebrates, San Diego Natural History Museum,
P.O. Box 1390, San Diego, California 92112

From time to time, we who live near the coast look inland and find that there are beautiful mollusks that do not live in the ocean. *Glyptostoma newberryanum* (W. G. Binney, 1858) in the Megomphicidae is one of these lovely finds (Figure 1).

Jeremy Hutsell, a San Diego Shell Club member now living in Topeka, Kansas, was hiking in Mission Trails Regional Park in San Diego in March of this year after the heavy rains. On his first visit he found several empty specimens of this flat, polished brown snail shell. On a second visit he found living specimens of *G. newberryanum* among rocks on a steep hillside 500 feet from the west side of the San Diego River, which flows through the park.

Later that same month, Mitchell Parlett found a living specimen of the species in Ramona under rocks on his property. None of us had seen this species before and I sent Jeremy's shells to Barry Roth, who kindly identified them for us and suggested I read G. W. Cox (1982).

In this interesting and informative article "The Importance of Being Flat" in **Environment Southwest** (no. 498:9-11), Cox wrote that the snail can attain an age of 20 to 30 years, growing slowly (a 31 mm specimen being about ten years old and reaching maturity at about 35 mm). The largest recorded specimen was 47 mm in diameter and found near Jamul (Cox, 1982). Mature snails lay a clutch of about six large, milky-white eggs deep in the moist soil. Cox stated that the flatness of *G. newberryanum* aids the snail in working its way down to the moist soil at the bottom of rock piles where it both lays its eggs and aestivates during the hot summer. This snail, according to Cox, "cannot affix the opening of the shell to a rock surface, nor can it secrete a protective membrane across the shell mouth. Survival over the dry summer depends on its ability to reach a moist aestivation site."

Cox also mentioned that *G. newberryanum* often lives among *Helminthoglypta tudiculata* (Binney, 1843) [see Hertz (1989) Festivus 21(10):94-95, fig. 2] in the chaparral in coastal areas. Jeremy found a live specimen of *H. tudiculata* in the same area as *G. newberryanum* on his second trip to the park.

Barry Roth suggests that because *G. newberryanum* takes a long time to mature and has a low reproductive rate, the species would probably be slow to build up its population numbers after any catastrophe. My thanks to Dr. Roth for his suggestions and for identifying the species.

Figure 1. *Glypostoma newberryanum* (W. G. Binney, 1858), two specimens. Top (spiral view): 31.2 mm diam., Bottom (basal view): 30.8 mm diam. Leg. J. Hutsell. Photo: David K. Mulliner.

IN MEMORIAM

LEROY H. POORMAN

1913-1993

It is with deep regret that we report the passing of member and friend Leroy H. Poorman on May 18, 1993. Roy was well-known to local members having written papers for **The Festivus** and having presented many interesting programs to the Club.

Roy was an active amateur malacologist specializing in Panamic Mollusca who described 10 species as author and 57 as coauthor (see below). The species *Conus poormani* Berry, 1968, and *Favartia poormani* Radwin & D'Attilio, 1976, were named in his honor. Roy was, for a number of years, a research associate in Malacology at the Natural History Museum of Los Angeles County and was an active member in several west coast shell clubs. Recently he had been hard at work completing 12 semi-scientific molluscan stories for children which he had illustrated with his fine color prints.

Our condolences are extended to Roy's wife, Forrest, his daughter Teri and son Ron and granddaughters Amanda, Brittany and Chelsea Poorman.

Below is listed the species described by Roy as sole author and coauthor and a bibliography of his molluscan papers.

Species Described by Leroy H. Poorman

1980b. *Murexiella mildredae*
Pazinotus advenus
1981a. *Fusinus consagensis*
Fusinus humboldti
Fusinus magnapex
1981a. *Fusinus paulus*
Fusinus sonorae
1983. *Daphnella levicallis*
Murexiella venustula
Anachis (Parvanachis) mullineri

Species Coauthored by Leroy H. Poorman

McLean & Poorman, 1970
Bellaspira margaritensis
B. clarionensis
B. acclivicosta

McLean & Poorman, 1971.
Calliclava jaliscoensis
C. lucida
C. rhodina
C. subtilis
Elaeocyma amplinucis
E. melichroa
Kylix contracta
K. woodringi
Leptadrillia firmichorda
Syntomodrillia vitrea
Agladrillia badia
A. flucticulus
A. gorgonensis
Drillia (Drillia) cunninghamae
D. (D.) inornata
D. (D.) sinuosa
D. (D.) tumida
D. (D.) valida
D. (Clathrodrillia) berryi
Cerodrillia asymmetrica
Splendrillia academica
S. arga
S. bratcherae
Fusiturricula andrei
Crassispira (Dallspira) martiae
C. (Striospira) coracina
C. (Monilispira) currani
Lioglyphostoma rectilabrum
Maesiella maesae
Carinodrillia lachrymosa
Compsodrillia gracilis
C. olssoni
C. opaca
C. undatichorda
Borsonella abrupta
B. galapagana
Cymakra baileyi
C. granata
Clathurella maryae
Glyphostoma (Glyphostoma) pustulosa
G. (G.) scobina
Euclathurella acclivicallis
Acmaturris ampla
Thelecythara dushanae
Kurtzia elenensis
K. humboldti
Pyrgocythara angulosa
Daphnella gemmulifera
D. retusa
Rimosodaphnella deroyae
Philbertia shaskyi
Kermia informa
Veprecula tornipila

Poorman & Mulliner, 1981
Crosslandia daedali

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(a.k.a. L. H. Poorman, Leroy Poorman and Roy Poorman)

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1973b. Small boat dredging today. Tabulata 6(1):8, 2 figs.

1973c. Shells of the west coast of the Americas. Tabulata 6(1):15.

1977. A diary of retirees. Festivus 8(6):36-39, 2 figs.

1980a. Reinstatement of two species of *Murexiella* (Gastropoda: Muricidae) from the tropical eastern Pacific. Veliger 22(3):273-276, figs. 1-7, (Jan.).

1980b. Two new molluscan species (Gastropoda: Muricidae) from the tropical eastern Pacific. Veliger 22(4):361-363, figs. 1-4 (Apr. 1).

1980c. New records from the tropical eastern Pacific for *Recluzia palmeri* (Dall, 1871). Veliger 23(2):183 (Oct. 1).

1981a. New species of *Fusinus* (Gastropoda: Fasciolariidae) from the tropical eastern Pacific. Veliger 23(4):339-344, figs. 1-8 (Apr. 1).

1981b. Comments on two misunderstood fusinids (Gastropoda: Fasciolariidae) from the tropical eastern Pacific. Veliger 23(4):345-347, figs. 1-4 (Apr. 1).

1981c. *Rhizochilus* in the Gulf of California (Neogastropoda: ?Coralliophilidae). Veliger 24(2):165-166 (Oct. 1).

1982a. Three *Capulus* species in the eastern Pacific: some comments. Festivus 14(5):52-57, figs. 1-5 (May).

1982b. Molluscan populations at Bahía San Carlos, Sonora, Mexico. Festivus 14(9):101-104, map (Sept.).

1983. New molluscan species (Gastropods: Neogastropoda) from the tropical eastern Pacific. Veliger 26(1):5-9, figs. 1-7 (July 1).

1986. *Crosslandia daedali* Poorman & Mulliner, 1981. Festivus 18(2):21-22, figs. 1-2 (Feb. 13).

1990. Have you seen this one, *Folinia histia* (Bartsch, 1915)? (Gastropoda: Rissoidae). Festivus 22(9):98-99, figs. 1-3 (Sept. 13).

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DUSHANE HELEN and ROY POORMAN

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1963. Disaster? Adventure? Mexican style. *ibid* 4(4):12-13.

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1967a. Shelling in a teaspoon. *ibid* 8(4):9-10.

1967b. Feliz Navidad. *ibid* 8(6):17-18.

1968a. The marine Hilton. *ibid* 9(1):1-4.

1968b. Ellen had a shell-in. *ibid* 9(4):14-17.

1973. Tetas de Cabra--hoy! Tabulata 6(3):3-5.

1978. Additional molluscan records from Bahía de los Angeles, Baja California Norte. Veliger 20(4):369-374, map (Apr. 1).

1979. The San Carlos Rectangle. Festivus 11(4):30-31, 2 figs. (Apr.).

1980a. *Natica (Lunaia) lunaris* Berry, 1964. Festivus 12(7):90, fig. 1a-1b (Jul.)

1980b. Range extension for *Trigonostoma elegantulum* Smith, 1947. Festivus 12(10):127, 1 fig. (Oct.).

1981. *Colubraria xavieri* Campbell, 1961 (Gastropoda: Cymatiacea), the second known specimen? Festivus 13(9):102-103, fig. 1 (Sept.).

1988. A report of the molluscan species in the San Carlos Rectangle, Sonora, Mexico, collected by Forrest L. and Leroy H. Poorman from December 1953 to December 1983. Festivus 20(6):47-63, map (June 9).

C. M. HERTZ, editor

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Lifestyles of the Small and Cryptic:
West Mexican Gastropod Feeding and Reproductive Activities

Dr. Hans Bertsch, Chair, Department of Mathematics and Natural Sciences at National University, will give this illustrated program with slides of mollusks in their natural surroundings.

Meeting date: August 19th
Shells of the month: Gulf of California gastropods

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - August 19, 1993

The meeting was called to order by President Carole Hertz. After introduction of guests and acceptance of the minutes as published in **The Festivus**, there were several announcements.

It was announced that the Club's reception at the recent WSM meeting was successful and attended by quite a few members. The Club also sold many supplements of **The Festivus.** George Kennedy thanked the Club for its donation of reprints to the WSM reprint sale which provides additional money to the student grants.

A sign-up sheet was passed for the September party [see details below] and Carole announced that the Christmas party on December 4th will be Mexican in theme and held at the Guadalajara Grill in Old Town.

Vice-President Hugh Bradner then introduced our speakers for the evening, Susan Hector and Martin Rosen, who gave a most interesting presentation on the archaeology of southern California.

Susan began the presentation with a background on the science. She told that there were 13,000 archaeological sites in San Diego County and showed slides illustrating some of the markers for the different types of sites such as milling sites, rock art sites and homestead sites. She also illustrated the process of preparing a site for digging and explained the careful processes of digging and mapping the area and later the tedious lab work identifying the material collected -- much of which is shell. She showed several zip-lock bags of shell material collected from different depths at a site.

Martin continued the presentation with a discussion of his special interest in the anthropology of the archaeological sites, in particular, the worked shell material fashioned by the peoples for jewelry, ceremonial purposes, decoration for tools, and as a medium for trade. He has been studying a site at the Salton Sea and identified shells from both the Pacific Ocean and the Gulf of California in their worked beads showing that the people of the area traveled great distances.

Following the program, members and guests enjoyed the fossil displays by Nancy Schneider and Stan and Mary Regula, socialized and enjoyed refreshments provided by the Thomases and the Hertzes. Bob Schoening, visiting from the east coast, won the shell drawing.

The September Party--A Luau

The September party, with a Hawaiian theme will be held in the garden of Debbie and Larry Catarius on Saturday evening, the 18th. The menu and the music will be Hawaiian. Plan to come in your finest Hawaiian garb and enjoy great company and terrific food. A map with details will appear in the September issue.

Mark Your Calendars Now for the Club's Christmas Party

The 1993 Club Christmas party will be held on Saturday evening, December 4th at the Guadalajara Grill in Old Town. Plan to come. There will be a fine dinner, program and dancing afterward. Further details later.

NEW MEMBER

Ron Velarde, Marine Biology Lab, 4077 Harbor Dr. MS 45A, San Diego, CA 92101. 619-692-4903.

IN MEMORIAM
JOANNE LIGHTFOOT

ON THE FIRST RECORDS OF *CYPRAEA MONETA* LINNAEUS AND *CYMATIUM MUNDUM* (GOULD) ON THE WEST AMERICAN MAINLAND (CYPRAEIDAE: RANELLIDAE) WITH ZOOGEOGRAPHIC IMPLICATIONS

WILLIAM K. EMERSON

American Museum of Natural History, Central Park West and 79th Street,
New York, New York 10024-5192

INTRODUCTION

This paper reports the first records of specimens of the Indo-Pacific species, *Cypraea moneta* Linnaeus, 1758, and the circumtropical species, *Cymatium mundum* (Gould, 1849), on the continental shelf of the West Americas; see Figures 1-4. James Ernest of Balboa, Panama collected a living specimen of each taxon from Pacific Panama. They were found by him on a minus 2.5 foot tide, under rocks at Punta Itaco, Golfo Montijo, Veraguas, República de Panamá (ca. 7°40'N, 81°07'W), on March 12, 1993.

Cypraea moneta occurs throughout the Indo-Pacific faunal province, ranging from east Africa to the central Pacific Ocean (Burgess, 1985:228), where it is known from the Hawaiian Islands (Kay, 1979:196), French Polynesia (Richard, 1985:421), and the Line Islands (Kay & Switzer, 1974:279). It previously was recorded in the eastern Pacific only on the oceanic islands: Clipperton Island (Cate, 1969:117, fig. 19), Cocos Island (Cate, 1969:117), and the Galapagos Islands (Cate, 1969:117).

Cymatium mundum inhabits the Indian Ocean, is distributed widely in the western Pacific, and ranges into the central Pacific, where it occurs in the Hawaiian Islands (Kay, 1979:224, fig. C [as *C. gemmatum* (Reeve, 1844)]) and French Polynesia (Emerson, 1991:65, figs. 21, 22). It was previously reported in the eastern Pacific only from the Galapagos Islands (Emerson, 1991:65, figs. 9, 10). This species is also known from the western Atlantic (Emerson, 1991:65; Piech, 1993:90). The presence of these cypraeid and ranellid species living on the west American borderland is, thus, not unexpected. Many species of both Ranellidae and Cypraeidae are known to have planktotrophic larval stages that permit passive dispersal over great distances and across deep-water barriers (Emerson, 1991:67).

A REVIEW OF PREVIOUS REPORTS OF *CYPRAEA MONETA* IN EASTERN PACIFIC WATERS

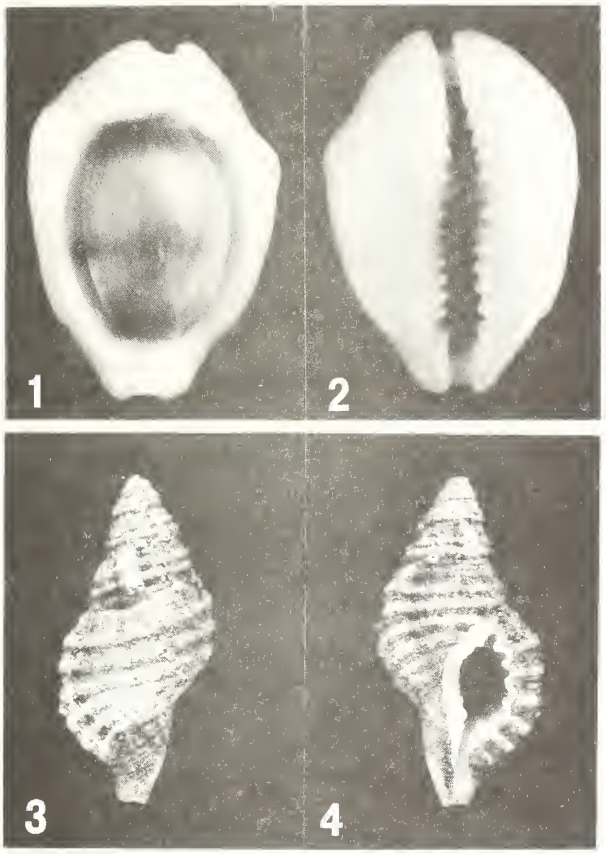
The early records of *Cypraea moneta* from the eastern Pacific were based on dead-collected, mostly beach-worn specimens known only from the oceanic islands. At the time, shore collecting was largely restricted to the intertidal zone, preferably during low tides, as these were the days before the advent of snorkeling and SCUBA diving. Hertlein (1932:45) collected beach shells at Chatham Bay, Cocos Island in February, 1932. He also mentioned the presence of this species in the Galapagos Islands, where six badly eroded beach specimens [CAS 23042] had been collected in 1906 at Isla Española [Hood Island] (Hertlein, 1937:307, pl. 1, fig. 11; Ingram, 1948:140).

Subsequent reports of *Cypraea moneta* occurring in the Galapagos Archipelago are sparse. Carmen Angermeyer found a large specimen (L=36.2, W=26.3, H=18.1 mm) washed upon the beach at Academy Bay, Isla Santa Cruz in the 1960s (AMNH 110418). Finet (1987:22, 14 figs.) reported observing three small populations inhabiting the intertidal zone at stations on the southern coast of Isla Santa Cruz, in April-June, 1984. A total of 14 specimens were collected, 7 of which were found

alive. According to Richards (1986:10) these populations did not survive the return of the colder water of the "normal" hydroclimatic conditions following the severe El Niño episode of 1982-1983. This conclusion has not been verified. Subsequent collecting in 1988 at one of the three sites (Academy Bay) where Finet had found one dead specimen in 1984, however, failed to reveal the presence of any additional specimens (Harland, 1988:4). Kay (1991:244) cited specimens of this cowrie in the collection of the Charles Darwin Research Station at Isla Santa Cruz. She has informed me that the Galapagan records are as follows: "Shells have been found on [Islas] Isabela, Genovesa and on [Isla] Santa Cruz, [where] several were collected alive at Puerto Ayora in 1984; February, April, May, and June". Dr. Kay attributes these occurrences to the El Niño episode of 1982-1983 (E. A. Kay, *in litt.*, May 6, 1993). Perhaps the larvae of this cowrie require the warmer waters of an El Niño event to survive dispersal to these islands, but the newly arrived animals may not be reproductively viable owing to cooling of the local waters following the El Niño episodes. Without a second generation, new introductions would be required to populate these outposts for the Indo-Pacific elements.

At Clipperton Island, Hertlein and Allison (1960:95, pl. 22, figs. 1, 2 [8 specimens obtained in 1956 and 1958 (AMNH 204596), 6 specimens obtained in 1958 (AMNH 86235)]) and Cate (1969:117) reported dead specimens to be common, especially in areas protected from violent wave action and on the shelf-side of the fresh-water lagoon in 1956 and 1958. At least one living specimen was collected by Conrad Limbaugh, who reported that this cowrie was commonly found on some of the tidal flats of Clipperton Island (Cate, 1969:117, pl. 14, fig. 19). Unfortunately, no date is given for Limbaugh's live-collected specimen, which was illustrated by Cate (AMNH 204596a). Salvat and Ehrhardt (1970:225) recorded five specimens obtained by members of the "Bougainville" expeditions to Clipperton Island in 1966, 1967, and 1968. Precise dates of collection are not provided for these specimens; no indication is given whether the specimens were collected alive or dead. All of the specimens of cowries representing 12 species (10 Indo-Pacific and 2 Panamic) obtained by the Scripps Institution of Oceanography expeditions of 1956 and 1958 were dead-collected (Hertlein & Allison, 1960). However, SCUBA diving was disrupted by the aggressive behavior of sharks, necessitating the use of a protective swimming cage by the divers on the 1958 expedition (Allison, 1959:32). Carl L. Hubbs commented on problems encountered with sharks during the visit to Clipperton Island by personnel of the Scripps Institution of Oceanography in December, 1954 (Hertlein & Emerson, 1957) as follows: "The outer margin [of the island] is so excessively full of sharks, that collectors are not very anxious to work there. The sharks were so numerous that they actually bit the oars of boats being rowed along the shore, and paid very little attention to shark repellent. In fact one of them came in and swallowed the bag of repellent that was used in a vain effort to get in collecting at a certain spot" (*in litt.* to Charles M. Breder, March 14, 1957). Despite the threat of sharks, extensive field collecting is required at Clipperton Island to determine what elements of the Indo-Pacific fauna have been successful in maintaining reproductively viable populations. Without such knowledge, the present records of Indo-Pacific specimens there may largely represent transitory intrusions of organisms that can not survive without repeated replenishment by larval recruitment or other dispersal agents, e.g. rafting on floating objects (cf. Emerson, 1991:73).

The marine molluscan fauna of Cocos Island, on the other hand, is reasonably well known, owing to the recent field surveys conducted during the past decade by Drs. Donald R. Shasky and Michel Montoya and their many associates (Shasky, 1989; Montoya, 1988). As noted above, dead specimens of *Cypraea moneta* were reported from Cocos Island by Hertlein in 1932. Additional beach specimens were obtained in 1963 by Paul Slud incidental to his ornithological field work (Emerson & Old, 1964:91 [6 specimens AMNH 107024]). Burgess (1985:229) observed that all of the records of this cowrie at Cocos Island known to him were based on empty shells. He speculated that the shells were accidentally introduced to the island by early and recent visitors arriving on sailing ships and were preserved in the beach drift. Shasky (1985:4) negated this conjecture when he and Kirstie Kaiser collected in May, 1985 three specimens living intertidally at Chatham Bay. Shasky did note, however, that in 1983, at the time of a severe El



Figures 1-4

Figures 1 and 2. *Cypraea moneta* (Linnaeus), L=32.4, W=22.7, H=14.9 mm. The dark coloration of the crown of the specimen in Figure 1 results from the presence of the soft parts preserved in the specimen.

Figures 3 and 4. *Cymatium mundum* (Gould), L=29.1, W=14.5 mm. Figures X 1.5.

Niño event, the water temperature was 85°F at all depths, but two years later the surface water was 78°F and at 70-90 feet the temperature was reduced to 65°F. He further noted that *Cypraea talpa* (Indo-Pacific species) and *C. isabellamexicana* (Panamic species) were common in 1983, but only dead specimens were found in 1985. He concluded that the warm water induced by the 1982-1983 El Niño conditions had a deleterious effect on these cowries. Subsequently, however, a living *C. talpa* was collected by Michel Montoya from 20 m off Isla Cáscara, west Cocos Island on February 11, 1991 (*teste* H. W. Chaney, May 26, 1993). Dr. Chaney further noted: "During both the February 1991 and April 1992 trips, *C. isabellamexicana* were numerous in 10-20 m. During April 1992 the water temperature at all depths to 120 feet averaged 88°F (!), about 8° warmer than in February 1991." Other Indo-Pacific gastropods at Cocos Island, such as *Terebra maculata* (Linnaeus) (Montoya & Kaiser, 1988:572) and *Conus tessulatus* Born (*teste* H. W. Chaney, 1993) appear to be well established there and to be tolerant of distressful changes in hydroclimatic conditions.

Kay (1991:245, table 5) reported that 16 of her 20 records with dates of Indo-Pacific species in the Galapagos Islands occurred in or within a year after an El Niño event. The few records with dates of living *Cypraea moneta* from Cocos Island, the Galapagos Islands, and the specimen reported herein from Pacific Panama also reflect a temporal occurrence during or immediately following periods of El Niño conditions. More precise data, however, are needed before the role played by El Niño episodes on the diversity of these insular and mainland faunas can be evaluated with certainty.

ACKNOWLEDGMENTS

I am greatly indebted to James Ernest of Panama Specimen Shells for his gift of these specimens and his continued support of our studies of the tropical fauna of the eastern Pacific Ocean and to Betty Jean Piech, an Associate in Malacology at the Delaware Museum of Natural History, who while in Panama, recognized the zoogeographic significance of Ernest's specimens and kindly transmitted them to me for study. Data were generously provided by Henry W. Chaney (Santa Barbara Museum of Natural History), E. Alison Kay (University of Hawaii at Manova) and Robert Van Syoc (California Academy of Sciences). Dr. Chaney kindly reviewed the manuscript. I thank my AMNH colleagues: Walter E. Sage, III and Kathleeen B. Sarg for technical assistance, Andrew S. Modell for photographic services and Stephanie Crooms for word-processing the manuscript.

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BOOK NEWS

Several new books of interest to mollusk enthusiasts have been advertised recently. They are listed below:

A CHRONOLOGICAL TAXONOMY OF *CONUS*, 1758-1840
By: Alan J. Kohn. 1993.
Smithsonian Institution Contrib.
368 pp., 27 pls., hardbound (cloth)
Price: $45.00.

BIVALVES OF AUSTRALIA, VOLUME I
By: Kevin Lamprell and Thora Whitehead. 1992.
Crawford House Press, Bathurst, NSW, Australia
i-xiii +182 pp., 77 (+2) color pls. and b & w drawings
Price: $40.00 (hardcover).

COMPOSITION OF SCIENTIFIC WORDS
By: Roland W. Brown. 1992 reprint
Smithsonian Press, 882 pp., hardbound (cloth)
Price: $35.00.

WORLD SEASHELLS OF RARITY AND BEAUTY (revised and enlarged)
By: Akihiko Matsukuma, Takashi Okutani & Tadashige Habe. 1991.
National Science Museum. 206 pp., 158 color pls.
Price: $55.00 (hardbound).

THE CLASSIC SHELLS OF THE WORLD
By: T. C. Lan. 1993.
T.C. Lan. Taipei. 224 pp., 200+ color pls. + brief text
No price given.

THE FIRST RECORD OF *CYPRAEA LYNX* FROM THE EASTERN PACIFIC

HENRY W. CHANEY

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road
Santa Barbara, California 93105

During the April 1993 collecting expedition to the islands of the Golfo de Chiriquí República de Panamá a single adult specimen of *Cypraea lynx* Linnaeus, 1758 was collected. This discovery represents the first report of this species from the eastern Pacific.

Cypraea lynx is an Indo-Pacific species commonly found under the coral rubble of shallow tropical reefs. Its established range, was figured by Burgess (1985) incorporating records extending from South Africa to Hawaii and French Polynesia. Hawaiian specimens are uncommon and occur in deeper water (Kay, 1979).

Recent reports and surveys of the Cypraeidae of the eastern Pacific have not mentioned any occurrence of *C. lynx* from the region (Emerson, 1978; Cantera, 1991; Groves, 1992; Skoglund, 1992). This includes records from Clipperton Island where the most Indo-Pacific cowries have been reported (Hertlein & Allison, 1960). It is therefore quite unusual to have this discovery from the continental shelf of Panama.

The specimen was collected as an empty shell out of a sand and rubble filled crevice on a rock terrace off the southern end of Isla Jicarita (07°12.65'N 81°47.70'E). Isla Jicarita is the smaller of the two islands situated at the southwest end of Isla Coiba in the Golfo de Chiriquí. The collector was Jack Stone of Santa Monica who discovered the shell at a depth of 10 meters on 16 April 1993.

Although collected as a dead specimen, the shell was relatively fresh in appearance with only a slightly dulled finish to the dorsum. It was approximately 40 mm in length, was fully mature, and had a pattern typical of Indo-Pacific specimens.

Subsequent surveys by the 10 diver collectors along the coast of Isla Jicarita from 16-17 April 1993 failed to find any additional specimens or fragments. There was also no evidence of *C. lynx* at any of the other 20 collecting stations sampled during our visit to the region.

It would seem doubtful at this point to report that this discovery implies the presence of a previously hidden population of *C. lynx* in western Panama. Instead this record is probably another example of the transient establishment of a wide ranging tropical species as discussed by Emerson (this issue). It is also possible that this specimen may have been accidentally introduced from a passing vessel. However the site of collection was considerably removed from local anchorages, making such an event unlikely.

Immediately after it was collected, the specimen of *C. lynx* was examined and verified by several members of our expedition. However there is no figure to accompany this report because the specimen was subsequently misplaced by its collector. This was highly embarrassing to all involved, given the significance of this discovery, and it means that until additional specimens are found, this report is based on the recollection of seeing a single, now missing ... lynx.

ACKNOWLEDGMENT

My thanks to William K. Emerson for reviewing this manuscript.

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ANNUAL MEETING OF THE WSM

JULES HERTZ

Santa Barbara Museum of Natural History, 2559 Puesta Del Sol Road
Santa Barbara, California 93105

The 26th annual meeting of the Western Society of Malacologists was held 27 June to 1 July 1993 at the Radisson Hotel, La Jolla. There were between 50 and 60 people in attendance for the three days of papers and assorted social events. It was a very successful meeting in very comfortable and convenient surroundings. The meeting rooms for the presentations as well as for the auction, banquet, and opening reception were all outstanding.

The 27th was a relaxing, get-reaquainted day, and following registration and an optional field trip to the Stephen Birch Aquarium, there was a wine/beer/cheese reception. The following morning, after opening remarks by WSM President Doug Eernisse, the Symposium on Contemporary Research on Mollusca convened. This symposium, put together by Paul Scott, had some excellent papers, many of which were presented by students. The session started with an outstanding presentation, "Phylogeography and Speciation in Molluscs" by David S. Woodruff. This paper discussed the use of allozyme variation in conjunction with traditional methods to reconstruct the phylogeographic history of populations and species. The discussion covered such diverse invertebrates as the Bahamian pulmonate land snails of the genus *Cerion*, the *Nautilus* of Palau and New Caledonia, six species of South American *Biomphalaria* and 21 species of Thai *Corbicula*.

Other outstanding papers were "Evolutionary Divergence in Gastropods from Long-Lived Lakes: Do Radiative Endemics Pack Species in Morphospace?" by Ellinor Michel, "Morphogenetic Programs and Evolution in the Gastropoda" by Louise R. Page, and "Molluscs as Biomonitors of Coastal Pollution? An Inside Look at the Assumptions" by Andrew Z. Mason. The latter paper detailed the use of *Littorina littorea* for studying on a cellular basis the bioaccumulation of metals. Energy dispersive x-ray microanalysis showed the sequestering of Ca, Mg, Mn and Zn into intracellular biomineralized concretions rich in pyrophosphate/orthophosphate and the association of Cd, Hg, and Ag with cytosolic proteins. The implications of these findings on the validity of using molluscs as biomonitors was discussed. It was emphasized that knowledge of the mechanisms of the metal accumulation was of vital importance and needed more funding.

Adjacent to the meeting room was an alcove where exhibits of shells, nudibranch models, photographs and publications were beautifully displayed. Display chairman, Don Shasky, with the help of Dave Mulliner were instrumental in getting the participants and setting up the displays. An outstanding display of enlarged pages and plates from a forthcoming book on Australian gastropods by Barry Wilson were mounted on a wall. The exhibits were ideally placed so attendees could view them before and after the sessions and at breaks.

On the 29th there was a session of Contributed Papers. I thought the most interesting of these was a second paper by Ellinor Michel entitled "A morphometric Analysis Of Variation in Radular Teeth of Sympatric Radiative Endemic Gastropods from Lake Tanganyika" and a paper by Hugh Bradner on "New Illustrations of *Cypraea* Radula." The morning session was followed by a group photograph and a well-attended workshop presentation by Dave Mulliner on techniques for photographing micromollusks. That evening we had a Reprint Sale and Auction following a wine/beer/snack social hosted by the San Diego Shell Club. As usual, the highly entertaining event was led by our infamous auctioneer, Henry Chaney. There were marvelous shells, framed photographs, and books to bid on. The combination of an outstandingly humorous and coercive auctioneer and good bidding material resulted in our most successful WSM auction to date. The reprint sale, conducted by George Kennedy, was also very successful, allowing many people to add to their libraries at bargain-basement prices.

On the final day, Hans Bertsch convened a symposium on Malacofauna of Western Mexico. To me, the most interesting were Sandra Millen's talk "Does the Bubble Snail *Haminoea angelensis* from the Gulf of California Differ from the Common *Haminoea vesicula*?" and Doug Eernisse's talk "The Brooding Chiton, *Lepidochitona thomasi* (Pilsbry, 1898), Discovered on the Oceanic Islets, Rocos Alijos, Mexico." Sandra Millen's talk included extensive anatomical work on both species of bubbles illustrated with scanning electron micrographs. At the end of her talk, Sandra asked the audience to vote their opinions: either one species or two. We were equally split, and of little help to Sandra.

The final day also included the annual business meeting and banquet. At the business meeting, it was announced that next year's annual meeting will be at Santa Barbara, California starting on June 26, 1994. The incoming WSM President is Kirstie L. Kaiser. The award for best student paper went to Ellinor Michel. The banquet, preceded by a no-host bar, was the last social event of the meeting. It gave the attendees one more opportunity to mingle, make new aquaintances, and renew old ones. The excellent meal was followed by the banquet speaker, Dr. Barry R. Wilson, from Kallaroo, Western Australia. His presentation, accompanied by slides, discussed early days in Western Australia, present conservation activities, and some discussion of the always fascinating topic: what is a species? He had some marvelous slides of color variations in the various species of *Zoila* cowries. Many of these we were able to personally view in John Jackson's exhibit. Barry Wilson's talk was both humorous and informative, and it ended the meeting on a high note.

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

The September Party--Saturday, September 18th

Come to the Luau! There will be no regular meeting this month.
(See page 79 and map on last page.)

CONTENTS

CLUB NEWS

The September Party--A Luau

The September party, with a Hawaiian theme will be held in the garden of Debbie and Larry Catarius on Saturday evening, the 18th. Festivities will begin at 6:00 P.M. Members and guests are requested to attend in their best Hawaiian or Island garb and plan to enjoy an evening with good friends, Hawaiian music, and Island cuisine.

The menu will include Puu-puus, Hawaiian Meat Balls, rice, summer fruit bowl, desserts and beverages. A signup sheet for the party (with a recipe for the Hawaiian Meat Balls) was passed at the July and August meetings. If you were unable to attend those meetings, and would like to attend the party and sign up for a menu contribution, call either Carole Hertz (277-6259) or Larry Buck (792-5404).

A map appears on the last page of this issue with instructions to the Catarius' home. Don't miss the party. Club parties are always the best!

New Sheller's Directory Available

Of Sea and Shore Publications announces the 17th edition of **A Sheller's Directory**. The Directory of 104 pages is $4.95 plus postage of $1.25 US or $1.50 overseas surface mail. It is available from Of Sea and Shore, P.O. Box 219, Port Gamble, WA 98364.

Available Issues and Supplements of The Festivus

Supplements

1992. Additions to the Panamic Province Gastropod (Mollusca Literature 1971 to 1992, by Carol Skoglund, (24:viii+169 pp.) postpaid domestic, $20. overseas surface postpaid, $22. overseas airmail postpaid $29.

1991. Additions to the Panamic Province Bivalve (Mollusca) Literature 1971 to 1990, by Carol Skoglund, (22:i-v+74 pp.) $11. postpaid domestic, $12. overseas surface, $15. overseas airmail.

1990. Additions to the Panamic Province Opisthobranch (Mollusca) Literature 1971 to 1990, by Carol Skoglund (22:i-iii+27 pp.) $6. postpaid domestic, $7. overseas surface, $12. overseas airmail.

1988. An Illustrated Catalogue of the Family Typhidae Cossmann, 1903 by D'Attilio & Hertz, (20:73 pp., 109 figs.) $11. postpaid domestic, $12. overseas surface, $15.50 overseas airmail.

1986. A Faunal Study of the Bivalves of San Felipe and Environs, Gulf of California, from the Gemmell Collection (1965 to 1976) by Gemmell, Myers & Hertz (18:1-72 pp., 78 figs.) $9. postpaid domestic, $10. overseas surface, $15.50 overseas airmail.

1983. Illustration of the types named by S. Stillman Berry in his "Leaflets in Malacology" by Carole M. Hertz (15:1-42 pp., 92 photos) $6.50 postpaid domestic, $7.50 overseas surface, $12. overseas airmail.

Yearly Volumes 1980 - 1993 @ $12.00 per volume plus postage. 1970-1979 @ $10 per volume plus postage. Some volumes available only partially xeroxed (1970-1973 all xeroxed). Make checks to San Diego Shell Club, 3883 Mt. Blackburn Ave., San Diego, CA 92111, USA.

Addition to the Roster

Sandoval, Alfonso Correa, 6 y 7 Gonzalez #214-Altos, Colonia Mainero, C.P. 87100, Ciudad Victoria, Tamaulipas, Mexico.

TWO ODD-BALL CYPRAEACEA: *JENNERIA PUSTULATA* AND *PSEUDOCYPRAEA ADAMSONII*

HUGH BRADNER

Scripps Institution of Oceanography,
La Jolla, California 92093

Following Schilder, most zoologists consider that there are two families in the superfamily Cypraeacea: Cypraeidae and Ovulidae. There are two species of Cypraeacea, *Pseudocypraea adamsonii* (Sowerby, 1832) and *Jenneria pustulata* (Lightfoot, 1786) that had previously been called cypraeids because of the appearance of their shells. (Figures 1 & 2). The beautiful *J. pustulata* found in the Panamic Province has a mantle line, aperture and teeth like the cowries, though it does not show a spire. The less well-known *P. adamsonii* living in the Panamic and throughout much of the Pacific and Indian Oceans, has small transverse dorsal ridges, a marginal labial callus, and teeth on both lips. It also shows no spire.

Figure 1. *Pseudocypraea adamsonii* (Sowerby, 1832), dorsal and basal views. Length: 8.8 mm long.

In 1924, Schilder established a new subfamily Eocypraeinae in the family Ovulidae, on the basis

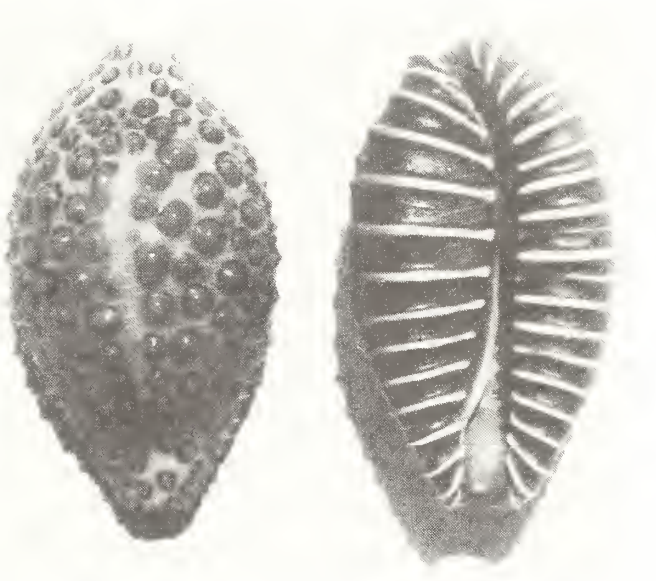


Figure 2. *Jenneria pustulata* (Lightfoot, 1876), dorsal and basal views. Length: 26.5 mm long.

of shell characters. The two species *P. adamsonii* and *J. pustulata* have been placed there. They are the only modern members of the genus, though there are numerous fossil species. A few years later when the animals of these two species were studied, it was evident that they are foreign to the cowries. Axel Olsson (1967) wrote that the radulae of *P. adamsonii* and *J. pustulata* are similar, so only his description of the *J. pustulata* radula will be given here:

"The radula is complex, thread-like and extremely long, made up of several hundred rows of teeth, 9 in each row. The rachidian (central) tooth is a small oval plate with 5 short cusps; there are

2 laterals on each side, the inner one with a sharp, fang-like cusp, the other flat, cleaver-like; marginals are 2 on each side, long, slender shaft, the inner with 5 finger-like branches, the outer with 14." Drawings of a half-row of each species are shown in Figures 3 & 4. For comparison Figures 5 & 6 show a drawing and a scanning electron microscope photo of characteristic *Cypraea* radula teeth. *Cypraea* rarely have as many as 200 rows of teeth, 7 in each row; all being of simpler form than the central tooth of *Jenneria.*

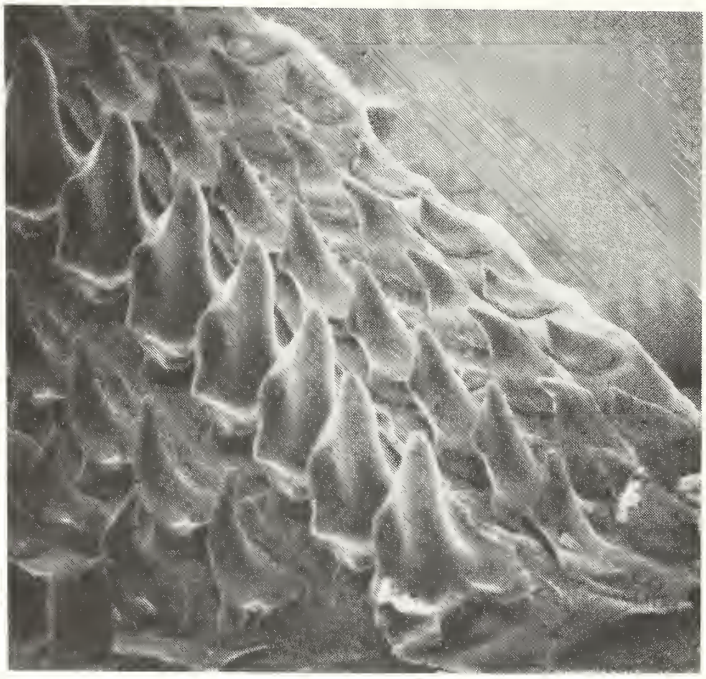
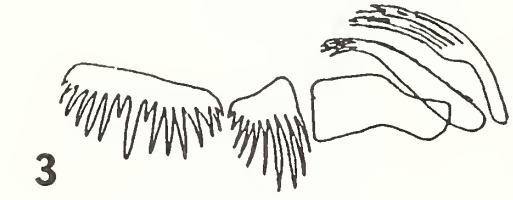


Figure 6. *Cypraea isabella*, scanning electron microscope photo of radula (x 100). Radula is 30 mm long, 143 rows; central tooth is 200 microns wide. Shell length: 34 mm.



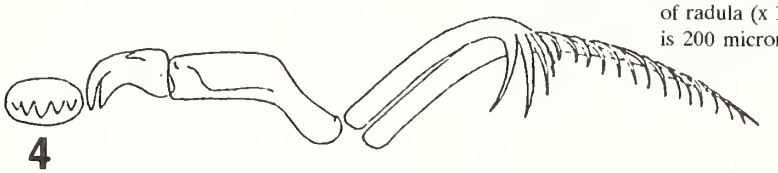


Figure 3. *Pseudocypraea adamsonii*, half row of teeth (After Thiele, 1931).
Figure 4. *Jenneria pustulata*, half row of teeth (After Thiele, 1931).
Figure 5. *Cypraea isabella*, half row of teeth (After Kay, 1960).

Figures 7 & 8 are the first published photographs of *P. adamsonii* and *J. pustulata* radulae. The photos reveal significant differences between the two species, though the radula structure is so feathery and complex that accurate drawings may be better than SEM or optical photos for visualizing the tooth shapes.

These two species are extreme examples of sea creatures that look much like cowries but are not even in the same sub-family, reemphasizing the need to study the animals as well as the shells, in considering taxonomy.

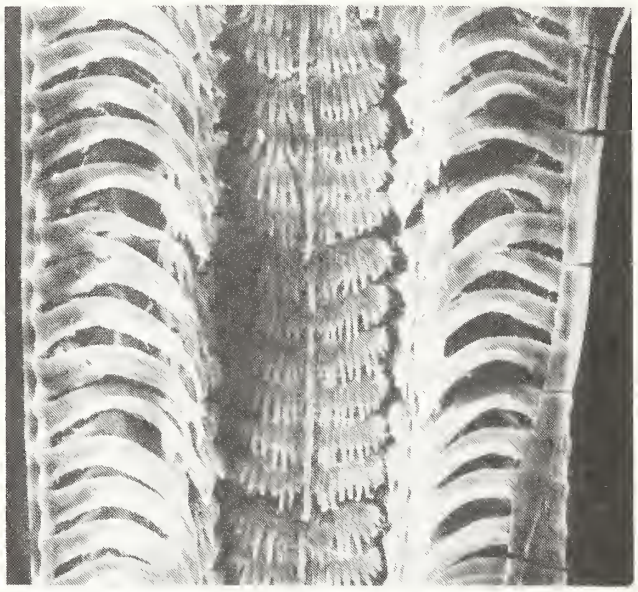


Figure 7. *Jenneria pustulata*, scanning electron microscope photo of radula (x 380).

Figure 8. *Jenneria pustulata*, scanning electron microscope photo of radula (x 380).

ACKNOWLEDGMENTS

Lindsey Groves brought to my attention these two cowrie-like species that might be included in a study of *Cypraea* radulae. This work was supported by a grant from the Director, Scripps Institution of Oceanography.

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WORLD SIZE RECORDS CONTINUES

It has been announced by R. Tucker Abbott that WORLD SIZE RECORDS will continue to be published. Mrs. Barbara Haviland will be carrying on the work of the late Robert Wagner and they hope to issue a new list early in 1994.

All records sent since October 1992 will be processed by Barbara Haviland and those having submitted entries will be informed of new records by her. All correspondence relating to WORLD SIZE RECORDS should be sent to:

Mrs. Barbara Haviland #51
6950 46th Avenue North
St. Petersburg, FL 33709

SHELLING ON THE RUN

JULES HERTZ

3883 Mt. Blackburn Ave., San Diego, California

In mid May of this year, Carole and I took our first organized land tour. This was to be a 21-day bus tour of Spain, Morocco, Gibralter, and Portugal. It was to be a "non-shelling" tour, since most of the tour was inland and it was "jam-packed" with visits to cathedrals, mosques, and palaces. However, just in case we got a minute to ourselves on the Mediterranean or on the Atlantic coast of Morocco or Portugal, we included in our luggage some ziplock bags and a couple of spatulas. We decided to forgo alcohol or the rest of our normal collecting gear.

Since this was our first tour, we were a little apprehensive that things might go slowly. But we were very fortunate. We had a great tour director, and we rarely had a free moment. A typical day started with breakfast around 7:00 AM, departure around 8:30 AM, traveling and touring all day, dinner finally about 9:00 PM with an occasional show included, and then to bed around 10:30-11:00 PM. Of course we lived out of our suitcases, so packing and unpacking were not very time consuming. The local guides in each of the cities were usually very good, and the sightseeing was outstanding. The big problem was trying to remember what we had seen, where we saw it, etc. Neither Carole nor I are diligent in making notes, so we will probably have interesting arguments as to where was that mosque or cathedral or palace, who was the King or Queen that built these marvelous structures or financed the various expeditions or wars, etc? Our slides have been developed, and now we are researching where we were and what we saw.

Although we normally only collect marine shells, we started to get desperate and picked up some land snails in palace gardens and on city walls. We even picked out some nice bivalves from our marvelous paellas at lunch. After sightseeing in Madrid, Toledo, Córdoba, Sevilla, Jerez de la Frontera and Granada, we finally arrived in Torremolinos on day eight. We were in a hotel that was two blocks from the beach at the famous Costa del Sol on the Mediterranean, and we had a few hours on our own for local sightseeing. Almost everyone on the tour rushed to the local shopping area, but Carole and I rushed to the beach. The beach was beautiful sand, but not a rock in sight. There were lots of single *Cardium* and *Glycymeris* valves as well as valves of other bivalves but not a gastropod to be had. Of course, I was quite distracted by the beautiful topless sunbathers lying along the way and could have missed a golden cowrie. After about 30 minutes of walking in the hot sun and disappointing collecting, we were off to the business area to do our bit for the local economy.

The next morning we took a short bus trip, paralleling the Mediterranean, to Algeciras where we boarded the ferry to go to Tangier, Morocco. It was a pleasent ferry ride and Tangier had beautiful looking sand beaches, but unfortunately we were busing directly to Fez. It would be five days until we would see the Atlantic coast of Morocco. The northern portion, through which we traveled, was different than anything I had envisioned. It had lush farmland, some large rivers, mountains and forests, and even a modern resort village in the mountains that looked like Switzerland. We visited the Imperial cities of Fez, Meknes, Marrakesh, and Rabat. The architecture and carvings at the mosques and palaces is fantastic, and we were treated to a new dimension - wandering through the streets of the Medinas (old cities). The streets in the old cities are very narrow (barely room for the loaded donkeys) and form a maze. We were

thankful for our guides. There were hundreds of people milling about, many hawking their wares, and it was easy to get separated from our group. We were constantly cautioned to stay with our group and if we got separated just to stop and wait for someone to come back for you (the joke was that they would pick you up in three weeks when the next tour would come through). These narrow streets were lined on both sides with shops selling all sorts of things, not only tourist items but the daily necessities of the locals. Each of these shops were extremely small and narrow. There were butcher shops displaying their butchered goats and sheep, and stores for spices, beans, fruits and vegetables and many other things. There were several large specialty shops for tourists which the guides steered us to because they got good commissions on all our purchases. These included a beautiful rug shop, where we were served Moroccan tea while the owners and sales help told us all about Moroccan carpets. They kept unrolling what seemed like hundreds of rugs until two people in our group finally succumbed. I believe we might still be there had these people not made their purchases. We also went to a marvelous spice shop, where the owner gave us a very humorous rundown of their products. He would make a marvelous pitchman at our county fairs. During our travels, we stopped at a rock and mineral shop, where they sold local geodes, ammonites, trilobites and fossil nautiloids (*Geisonoceras sp*). Fossil quality was very poor, and we quickly lost our interest. Unfortunately, the bus didn't stop at the many places along the highways where the locals had set up stands to sell fossils and minerals.

Our first sight of the Atlantic was at our approach to Casablanca. We had no time to really collect there before we continued on to Rabat for the evening. The next morning would start a very unusual shelling experience. We collected before breakfast and after lunch and dinner in three different cities, the last being Tangier approximately 283 miles from where we had started that morning. This meant running down to the beach before breakfast at Rabat and getting some live specimens of *Monodonta, Bulla* and a *Naticaria,* followed by touring and busing until we arrived at a seaside restaurant at Asilah. Beating the crowd, we were served first, and we were off to collect a second time. Here we collected live *Patella intermedia, Siphonaria pectinata* and *Littorina punctata.* Finally, we arrived that afternoon in Tangier, where we toured through the old city and then ran to the beach for our final collecting of the day. Our first two outings that day had been in muddy, rocky areas, whereas in Tangier it was a very beautiful sand beach. This latter beach had a large variety of dead shells.

The next morning we ferried to Gibralter for a two day stay. Again our hotel was on the beach, and we were able to avoid sightseeing for a few minutes to walk the beach. Like always, we could not collect at low tide nor did we have enough time to find the best collecting spots.

Our final view of the Atlantic was at Cascais, Portugal, where I was able to sneak away from the tour for a few minutes and find a few dead things on a sterile-looking sandy beach. More touring of Portugal and Spain completed our trip.

Table 1 is a list of the shells we found, with the best identifications I have to date. I used Tebble (1966) and Terreni (1981) for identifying the bivalves and Poppe and Goto (1991) for the gastropods. I am grateful to Michael Hollmann for identification of the naticids.

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1966. British Bivalve Seashells. Alden Press Osney Mead. Oxford. 212 pp, 12 pls, 110 figs.

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TABLE 1.

List of Marine Shells Collected

Location	Date	Species
Torremolinos, Spain	5/19/93	*Tectonatica filosa* (Philippi, 1844) *Spisula solida* (Linnaeus, 1758); valves *Acanthocardia tuberculata* (Linnaeus, 1758); valves *Venus casina* (Linnaeus, 1758); valves *Mactra corallina* (Linnaeus, 1758); valves *Mytilus edulis* Linnaeus, 1758 *Donax variegatus* "Gmelin" Linnaeus, 1791; valves *Callista chione* (Linnaeus, 1758); valves *Glycymeris glycymeris* (Linnaeus, 1758); valves
Casablanca, Morocco	5/24/93	*Gibbula umbilicatus* (Linnaeus, 1758) *Mytilus edulis* Linnaeus, 1758
Rabat, Morocco	5/25/93	*Monodonta lineata* (da Costa, 1778); live *Natica vittata* (Gmelin, 1791); live *Bulla sp.*; live *Parvicardium ovale* (Sowerby, 1840) *Venerupis decussata*(Linnaeus, 1758); restaurant *Venerupis sp.* *Mactra sp.* *Donax variegatus* "Gmelin" Linnaeus, 1791
Asilah, Morocco	5/25/93	*Patella intermedia* Murray, 1857; live *Littorina punctata* (Gmelin, 1791); live *Siphonaria pectinata* (Linnaeus, 1758); live *Callista chione* (Linnaeus, 1758); valve
Tangier, Morocco	5/25/93	*Astraea rugosa* (Linnaeus, 1767) *Columbella rustica* (Linnaeus, 1758) *Trivia pullusina* Locardi, 1892 = *T. pullex* (Solander in Gray, 1827) *Naticarius hebraeus* (Martyn, 1784) *Calliostoma zizyphinum* (Linnaeus, 1758) *Haliotis tuberculata lamellosa* Lamarck, 1822 *Vermetus cf. rugulosus* Monterosato, 1878 *Mesalia mesal* (Deshayes in Lamarck, 1843) *Calyptraea chinensis* (Linnaeus, 1758) *Conus ventricosus* Gmelin,1791 = *C. mediterranus* Hwass in Brugière,1792 *Hydrobia sp.* *Ensis siliqua* (Linnaeus, 1758) *Parvicardium ovale* (Sowerby, 1840);valves *Donax variegatus* "Gmelin" Linnaeus, 1791; live *Lyonsia ?norwegica* Chemnitz, 1798 = Gmelin, 1790 *Tellina tenuis* (da Costa, 1778) *Mytilus edulis* Linnaeus, 1758; valves *Mactra corallina (Linnaeus, 1758);* valves
Gibralter	5/27/93	*Patella candei* d'Orbigny, 1840; live *Thais haemastoma* (Linnaeus, 1767) *Venus casina* (Linnaeus, 1758) *Mytilus edulis* Linnaeus, 1758 *Glycymis glycymeris* (Linnaeus, 1758); valves *Pododesmus sp.*
Cascais, Portugal	5/30/93	*Cyclope donovania* Risso, 1826 *Spisula solida* (Linnaeus, 1758) *Tellina tenuis* (da Costa, 1778); valves

AN INTERESTING FIND OFF THE CHANNEL ISLANDS (GASTROPODA: EULIMIDAE)

DOUG VON KRIEGELSTEIN
11288 San Juan, Loma Linda, California 92354

On September 16, 1990 I was scuba diving in Bechers Bay on the northeastern end of Santa Rosa Island of the Channel Islands of Southern California. The sandy-gravel bottom at 12 meters (40 feet) was covered with literally millions of a very small (6-8 mm by 30 mm) ivory-colored sea cucumber-like echinoderm (Figure 1). These creatures were partially buried in the bottom.

Figure 1. Echinoderm with *Melanella* attached. Found in 12 meters off northeastern end of Santa Rosa Is., California. Photo: David K. Mulliner.

On this particular day, while fanning the bottom I spotted an echinoderm with a live 5 to 6 mm white eulimid specimen attached (Figure 2). Later that same day at Santa Cruz Island, I found two more specimens of that echinoderm each with a eulimid attached.

Figure 2. *Melanella* specimen with proboscis extended shown in Figure 1. Photo: David K. Mulliner.

I sent two specimens each of both host and parasite to Dr. Anders Warén of the Swedish Museum of Natural History in Stockholm for identification. In his reply to me he stated the following:

"The specimens belong to the genus *Melanella*, sensu stricto, but I can at present give no names for them. That would require comparison with the holotypes of several of the species described by Bartsch in 1917, in his revision of west American eulimids. I have kept the specimens and their hosts here, to do that later when I have accumulated more material, possibly to make a paper on holothurian parasites from your area, something like the paper I recently published in the Veliger on some more tropical species."

Obviously more material would be very helpful for further study by Dr. Warén. He is especially interested in material that is collected with the parasite attached to the host. Send both host and parasite to Dr. Anders Warén, Swedish Museum of Natural History, Box 50007, S-10405 Stockholm Sweden.

I would like to thank Dave Mulliner for his artistic photography and Anders Warén for his initial generic classification of these two specimens.

JANTHINA, AN UNUSUAL OCCURRENCE AT PACIFIC BEACH, SAN DIEGO

CAROLE M. HERTZ

3883 Mt. Blackburn Ave., San Diego, California 92111

On 27 March 1993, my husband Jules found a 14 mm *Janthina* specimen (animal intact) identical to the one figured in Abbott (1974, pl. 3, fig. 1181) as *Janthina exigua* Lamarck, 1816, at Tourmaline Surfing Beach, Pacific Beach, San Diego. A thorough search of the surrounding area revealed no additional *Janthina* nor any of the pelagic *Velella velella* (Linnaeus, 1758), often found in association with *Janthina*. I had found two specimens of this same species at the same beach in November-December 1978. Finding *Janthina* in the San Diego area is unusual; to my knowledge the last time a large number were found with their associated floats was early May 1967. At that time they were found at La Jolla Shores, and on some Del Mar beaches. At that time the species found was *J. globosa* Swainson, 1822.

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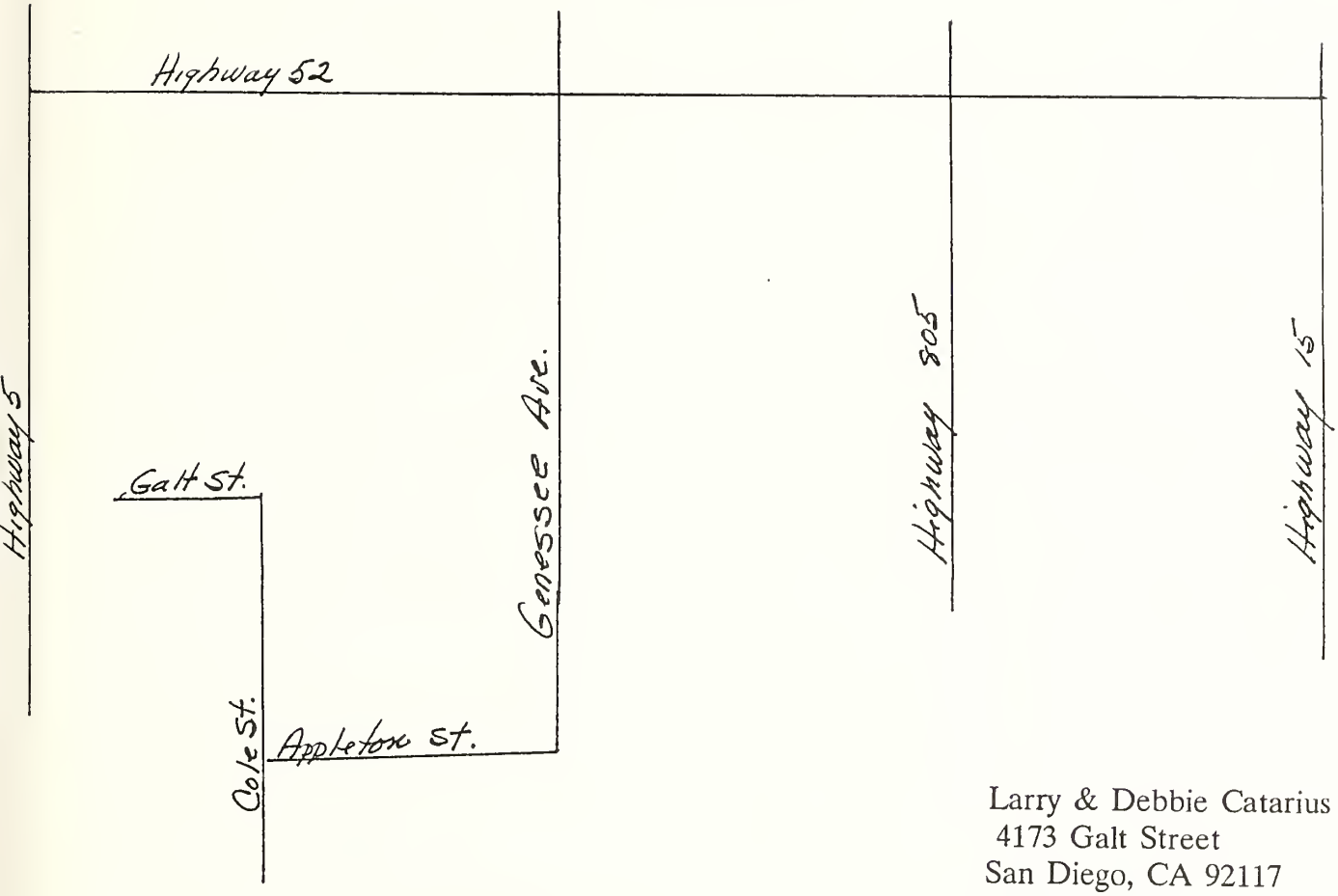
THE SEPTEMBER PARTY - A LUAU

Saturday, September 18th

6 P.M. - ?



Larry & Debbie Catarius
4173 Galt Street
San Diego, CA 92117
(619) 270-4376

From 5 take 52 east to Genessee Ave. south.
From 15 or 805 take 52 west to Genessee Ave. south.
Go to light at top of the hill (Appleton St.).
Go right on Appleton to first stop sign on Cole St.
Go right on Cole St. It's the 3rd house on the left.
Look for an anchor in the front yard.

REMEMBER: Wear your best Hawaiian finery, bring your potluck contribution, serving and eating utensils. If possible, bring folding chairs.

Come and have a fantastic time!

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Aliens in the Bay: the Invasion of Exotic Mollusks in California Waters

Jeff Crooks, a doctoral student at Scripps Institution of Oceanography will give a talk on this significant problem. He will accompany his presentation with slides.

Mini-auction of Books and Reprint Sale

Shells of the month: California shells
Meeting date: October 21st

CONTENTS

CLUB NEWS

The September Party--A Luau

The September party, with a Hawaiian theme was held in the gaily decorated garden of Debbie and Larry Catarius on Saturday evening, the 18th. Festivities began at 6:00 PM with the thirty-five Club members and guests enjoying Dave's Punch and puu-puus while Island music played in the background.

Members old and new enjoyed socializing and partaking of the delicious buffet dinner of Hawaiian meatballs, rice, fresh fruit bowl and assorted desserts. The weather was perfect, the company grand and the party a huge success--as always.

Our thanks to Debbie and Larry Catarius, our most congenial hosts.

From the Minutes - San Diego Shell Club Meeting - August 19, 1993

Vice President Hugh Bradner called the meeting to order and after introduction of guests and announcements concerning the September party, introduced the speaker for the evening, Hans Bertsch, Chair of the Math and Science Department at National University whose program was entitled, "Lifestyles of the Small and Cryptic: West Mexican Gastropod Feeding and Reproductive Activities."

Hans' presentation was accompanied by a profusion of slides showing many different species of nudibranchs, many undescribed, in their natural habitats, feeding and mating. Several peculiar forms living in hydroids were also shown. The presentation was both informative and entertaining.

A refreshment break followed the program with cookies provided by Terry Arnold and Marge and Ken Lindahl.

Hard Times at the San Diego Natural History Museum

As a result of severe budget problems, there have been many changes on the third floor of the Museum with the scientific staff severely depleted and only the departments of Paleontology and Botany with curators.

Dr. Richard Brusca, curator of Marine Invertebrates and Regina Wetzer, collections manager in that department, are both on a year's leave of absence with Rick Brusca heading the marine sciences program at the University of Charleston. The position of Curator of Invertebrate Zoology will remain vacant during this time and the Marine Invertebrate Department will be closed with no provision for visitors, loans or additions to the department's collection.

As stated in the September-October 1993 issue of **Field Notes**, the Museum is searching "for a temporary, one-year, collections conservation specialist to oversee the entomology, herpetology and marine invertebrate collections to ensure that these collections are maintained during the year we are without staff in these three departments."

The Scientific Library will remain open with librarian Ann Paine working to incorporate the marine invertebrate literature into the main library collection.

Additions and Changes to the Roster

New Member

Mark Kirwan, 300A Inchon Drive, Oceanside, CA 92054 (619) 385-0840

Changes of Address

Fred L. Leonard, 3441 Kirklees Road, Winston-Salem, NC 27104

Doug & Mary Luther, 4458 Sierra Drive, Honolulu, HI 96816.

The Club's Christmas Dinner Party

The San Diego Shell Club's annual Christmas Dinner Party will be held on Saturday evening December 4th at the Guadalajara Grill in Old Town. Mark your calendars so you won't miss the party. Details at the October and November meetings.

AN OVERVIEW OF THE KNOWN RECENT MICROMOLLUSCAN MARINE FAUNA OF THE ISLAS GALÁPAGOS INCLUDING MICROFAUNAL LIST

KIRSTIE L. KAISER*

Museum Associate, Department of Malacology
Los Angeles County Museum of Natural History, 900 Exposition Boulevard,
Los Angeles, California 90007

Charles Darwin described the Galápagos Archipelago as "a halting place" (James, 1988), while the Ecuadorian government refers to these islands as the Islas Encantadas (Enchanted Islands). The Islas Galápagos along with their diverse flora and fauna have been the object of one of the most intensive scientific studies of biodiversity in the world.

This is the first of several papers on the mollusks of the Islas Galápagos. Future papers will give detailed reports of the mollusks I researched there in February 1988 during seven days of scuba diving and intertidal work.

Micromollusks, as defined here, are those mollusks whose shells do not exceed 10 mm in their largest dimension at normal maturity. It is understood that 10 mm is a subjective number and that in the category of shelled marine mollusks several families have only some members that do not exceed 10 mm, while other families are characteristically minute and no adult members ever exceed the arbitrary dimension.

A sizeable percentage of the world's known marine molluscan fauna falls into the category of this definition of micromollusk. These minute invertebrates occur worldwide in tropical to Arctic seas but certainly the majority live in tropical waters and to a lesser degree, temperate waters. Many families of micromollusks have been found in the Pleistocene fossil record (Hertlein & Strong, 1939), but the majority are perhaps most fully represented in the existing faunas. Ponder (1983) speculates that members of the family Barleeidae are not common as fossils, probably because of their preference for hard bottom, shallow-water habitats. This reasoning may hold true for other micro-groups as well.

Considerable taxonomic study has been carried out on the macrofauna over the centuries. Due to the lack of more accurate magnification equipment, many of the microspecies were inadequately figured and described in the early years. Small size, superficial similarity, and descriptions made with lack or partial lack of the protoconch led to numerous mistaken identifications and erroneous generic placements (Marshall, 1983).

As better equipment became available interest in micromollusks increased. With the advent of the scanning electron microscope (SEM), soft anatomy, radular morphology, protoconchs, and other morphological features are now being illustrated and studied. This has become invaluable for species discrimination and taxonomic decisions in the whole of malacology, but in particular for the microspecies. Certainly in retrospect, the last 20 years has shown a surge of new taxa (Vaught, 1989), and these additions and revisions are mainly seen in the micromolluscan groups.

Expeditions

There were many early exploratory expeditions to the Islas Galápagos. Although a significant amount of scientific study was done on the terrestrial flora and fauna, much less attention was paid to the marine fauna and in particular to the

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micromollusks. Mentioned here are those expeditions that collected marine micromolluscan material which was subsequently annotated or described.

One of the earliest collectors of mollusks in the Galápagos was Hugh Cuming between 1827-29 aboard his yacht **Discoverer** (Hertlein & Strong, 1955). Beginning about 1832 his many finds were described by Broderip, the Sowerbys, Deshayes, H. & A. Adams, and others. Reeve, between 1832 and 1855, reported Cuming's findings in his monographs (Stearns, 1893). Carpenter (1857) published the first extensive list of the species collected by Cuming, which included five microspecies. In 1868 Dr. Simeon Habel collected mollusks in the Galápagos. A list of the species, which included several microspecies, was published by Wimmer (1879). Stearns (1893) published a comprehensive review of the early works on the conchology of the Islas Galápagos with a list of the molluscan fauna he compiled from these earlier efforts. Dall (1890) in "A preliminary report on the collection of Mollusca . . ." by the U. S. Fish Commission steamer **Albatross** in 1887-88, reported one deep water microspecies, *Microglyphis perconicus* (Dall, 1890) (Opisthobranchia), which so far remains endemic to the Islands. From subsequent expeditions of the **Albatross** Dall (1891) and others described several new microspecies from various families (Dall, 1908b) and specifically of the families Pyramidellidae (Dall & Bartsch, 1909), Epitoniidae (Dall, 1917), and Turritidae (currently Turridae) (Dall, 1919).

Leo G. Hertlein was a member of the California Academy of Sciences' G. Allan Hancock Expedition to the Islas Galápagos in 1931-1932 aboard the cruiser **Velero III**. Special efforts were made to collect samples of the microfauna in the waters around the Islands (Slevin, 1959). Nearly all the specimens were taken along the beaches or in very shallow water. Large quantities of this material were collected, and the sorting and identification has taken many years of study. Hertlein & Strong (1955) provided a list of these species collected at the Islas Galápagos. This extensive annotated list, with collecting stations, included many microspecies, some of which were reported for the first time from the Islands. Subsequent trips by the **Velero III** in the 1930s and later by **Velero IV** accumulated by dredging, and from bottom core samples, sand and rubble containing many micromollusks. Most of this grunge was stored at the University of Southern California (USC), unsorted, until it was transferred to the Los Angeles County Museum of Natural History (LACM) for accession into their collection. Several new microspecies were described from this material at LACM by McLean (1970a-d). Since 1970, sorting of this material has generated a large assemblage of micromollusks. Identification to species of the Hancock material is still underway.

Known as the 'St. George' Expedition, the **S. Y. St. George** was sent out in 1924 with a party of scientists to the Pacific via the Panama Canal. Tomlin (1927-1929) did an annotated list of the marine mollusks collected from Panamá to the Islas Galápagos, including Isla del Coco and several stations in-between. The list included four species collected from the Galápagos.

The Vanderbilt South Pacific Expedition of 1937 collected mollusks at Islas Galápagos and Schwengel (1938) listed beach shells picked up at Wreck Bay, Chatham Island. Of the 77 species listed, four are considered micro and of these, two new microspecies *Marginella rosa and Tralia vanderbilti* were proposed by Schwengel (1938).

In 1971, the Conchological Club of Southern California organized the Ameripagos Expedition to research the molluscan fauna of the Islas Galápagos. A considerable amount of micromolluscan material was sampled. Various lots of the micro-material are in the collections of Los Angeles County Museum (LACM), Santa Barbara Museum of Natural History (SBMNH), and San Diego Natural History Museum (SDNHM), while the remainder is in several southern California private collections. J. Hertz (1976-77) published on several families of micro-material from the Ameripagos Expedition.

The Italian expedition of L. Mares-G.R.S.T.S. of 1971-1972 reported collecting 64 species of marine mollusks. Ten of these were microspecies and all had previously been reported from the Islas Galápagos (Taviani, 1979).

Since the establishment of the Galápagos National Park in 1959 (Jackson, 1985), several scientific expeditions have conducted molluscan research but little mention of micromollusks was included in their reports until the F.N.R.S. Belgium Expedition of 1984. Y. Finet spent several months preparing for his part in this expedition by studying

collections of Galápagos material in six of the major scientific institutions in the United States. After spending March through July in the Islands in 1984, Finet (1985) published a preliminary faunal list of the marine mollusks of the Islas Galápagos in which he listed all the species of micromollusks he had researched in the collections of the U.S. museums, the Charles Darwin Research Station collection on Isla Santa Cruz, and the material he collected in the Galápagos while there. Since that time he published on the biogeography and endemism in mollusks of the Galápagos Finet (1989) and again revised the faunal list (Finet, 1991).

In 1986 the Galápagos Marine Resources Reserve was established (Broadus, 1987). Collecting of all marine fauna is now closely monitored and is restricted to persons granted permits by the Ecuadorian government for scientific research in an attempt to control the direction and quality of scientific research throughout the marine reserve.

In 1988 the Grupo Victoria Expedition was organized by M. Montoya, K. L. Kaiser, and D. R. Shasky. A permit was granted to collect and study the marine molluscan fauna and special attention was given to the microfauna. A total of nine days (February 12-20, 1988) was spent in the Islas Galápagos including the islands of Baltra, Santa Cruz, Santa María, Española, San Salvador, and Rábida. This resulted in the discovery of a wide range of unreported micromollusks. From examination of expedition material, Shasky (1989a,b) published additions and corrections to the preliminary list of Finet (1985).

Today there is ever increasing pressure for building the industry of tourism in the Islas Galápagos. This brings increased human settlement from the mainland as well as tourists. As economic development increases, so do the problems associated with terrestrial and marine habitat conservation. Hopefully, with increased environmental awareness, both conservation and scientific research will be properly prioritized and advanced.

Environment

The Islas Galápagos have over 1350 km of shoreline and according to Jackson (1985) are subject twice daily to tidal changes ranging up to 2.6 m at new and full moons with a mean of about 1.8 m. During the periods of low tide the temperature of the black lava rocks may soar quickly to 104° to 122°F [40° to 50°C] from the severe equatorial sun.

The Islands are influenced by seasonal oceanographic conditions in which marked seasonal changes in water temperature are brought about by the South Equatorial Current which is composed mainly of cold Peru Current (Humbolt Current) water, but with a component of warm water from the North Equatorial Countercurrent to the north. At irregular intervals the waters surrounding the Galápagos are affected by the El Niño phenomenon during which the Peru Current is deflected far to the west of South America, thus allowing warm water from Central America to sweep far to the south causing extensive warming (Rosenblatt & Walker, 1963). Hertlein & Strong (1955) reported the temperature of surface waters to show a variation from 66° to 86°F [19° to 30°C]. The 86° could only be in El Niño years (McLean, pers. comm.). Unfortunately, to my knowledge, no systematic ecological work has been done on the Galapagan marine molluscan fauna during these changes brought about by El Niño.

In the Galápagos, micromollusks have an intertidal to abyssal distribution. Several types of habitats occur throughout the Islands including rocky regions, lava and coralline sand of varying granulometry, algae, coral communities, mangrove lagoons, and mud flats. Being volcanic in origin, the Galápagos are best characterized by rocky intertidal and subtidal zones which vary in character from one place to another, mainly as a result of differing slopes and exposures to wave action. The richness of microspecies is reasonably predictable and largely a function of substrate type and variety. Areas that have a diversity of stable substrate types harbor more micromolluscan fauna than do the more homogeneous habitats. In addition to these complex habitats, micromollusks are known to have symbiotic, parasitic, and commensal relationships to various marine flora and fauna.

Collecting Methods

Taking into account all of the characteristic features of zonation, food sources, and habitats of micromollusks, one can imagine the inherent

problems associated with collecting methods and data compilation. In order to ascertain the biogeographic affinities of a certain species, one must systematically isolate each of these features.

A number of collecting methods used for scientific study have been utilized in the Galápagos, including bottom grabs, core samples, and various dredges. All of these techniques are useful below SCUBA depths, but the specific habitat is not always clear upon final retrieval of the mollusk. The issue of shell size remains a problem with the use of SCUBA since it is difficult to see micromollusks *in situ*. Most microspecies live in very protected areas, and therefore, when habitats including rocks, coral slabs, etc. are disturbed or shaken into a canvas bag or similar container, one is still left with uncertainty as to the actual habitat. The examination of microspecies living in the intertidal zone is somewhat easier to control as magnification equipment can be used in many situations. All members of the family Eulimidae live on host echinoderms so, when possible, the host animal should be collected and examined in a more conducive environment.

Summary

It is my belief that in the Islas Galápagos the number of micromolluscan species is much greater than current faunal records show.

To date, 686 species of verified marine mollusks have been recorded (Keen, 1971; Finet, 1985, 1991; Skoglund 1989, 1991a, 1991b, 1992). Of those 201 are microspecies. The 16 micromollusks shown here (Figures 1-16) were originally described from the Islas Galápagos and give a varied representation of the microfauna. Of those figured, five have now been recorded outside the Islas Galápagos.

Based on the work of (Keen, 1971; Finet, 1985, 1991; and Skoglund, 1989, 1991a, 1991b, 1992), I have calculated that 23.9% of the known Galapagan micromollusks remain endemic. I believe the high endemicity of the molluscan fauna, in particular the microspecies, will continue to diminish as more deliberate sampling and study continues in the tropical eastern Pacific including the other oceanic islands of Isla Malpelo, Isla del Coco, Clipperton Island, and Islas Revillagigedo.

Future papers in this series will treat the mollusks collected in the Islas Galápagos. At the end of this study a representative sampling of these micromollusks will be deposited in the Charles Darwin Research Station, Isla Santa Cruz, Islas Galápagos.

Format for species list

A list of Galapagan micromollusks follows on Page 105. It is in taxonomic order according to Skoglund (1989, 1991a, 1991b, 1992) and/or Vaught (1989) with Keen numbers when applicable. An asterisk preceding a species name denotes endemicity according to previous authors. Taxonomic changes not annotated here can be found in Skoglund *loc. cit.*. Following each species entry are literature sources for the Galapagan records beginning with Keen (1971). Additional remarks are added when appropriate.

Acknowledgments

I wish to extend my appreciation to the government of the República de Equador and especially to the Ministero de Agricultura y Ganadería and to the Departamento de Parques Nacionales y Vida Silvestre. I thank James H. McLean of the Los Angeles County Museum of Natural History for access to the type collection and for the use of his numerous type photos. Lindsey T. Groves, of the same institution, was helpful in gathering critical information from the type collection and both James H. McLean and Lindsey T. Groves verified the information accompanying the figures. This paper would not have been possible without the use of the ZMA library and facilities in Amsterdam. Special thanks to Robert G. Moolenbeek and H. E. Coomans for their assistance and to Abraham N. van der Bijl and Rykel de Bruyne for their computer skills. My thanks also to Bertram C. Draper for the photo plates, to Donald R. Shasky and Sharon S. Legge who offered helpful comments on the manuscript, to David K. Mulliner who gave information on type material and to Michel Montoya who was indispensable in helping procure permission for the Grupo Victoria to do research in the Islas Galápagos. And for their encouragement, critical review, and suggestions, I thank Jules and Carole M. Hertz.

Abbreviations Used

AMNH	American Museum of Natural History
ANSP	Academy of Natural Sciences of Philadelphia
CAS	California Academy of Sciences
LACM	Los Angeles County Museum of Natural History
MCZ	Museum of Comparative Zoology, Harvard University
SBMNH	Santa Barbara Museum of Natural History
SDNHM	San Diego Natural History Museum
USC	University of Southern California
USNM	United States National Museum of Natural History, Smithsonian Institution
ZMA	Zoölogisch Museum, University of Amsterdam

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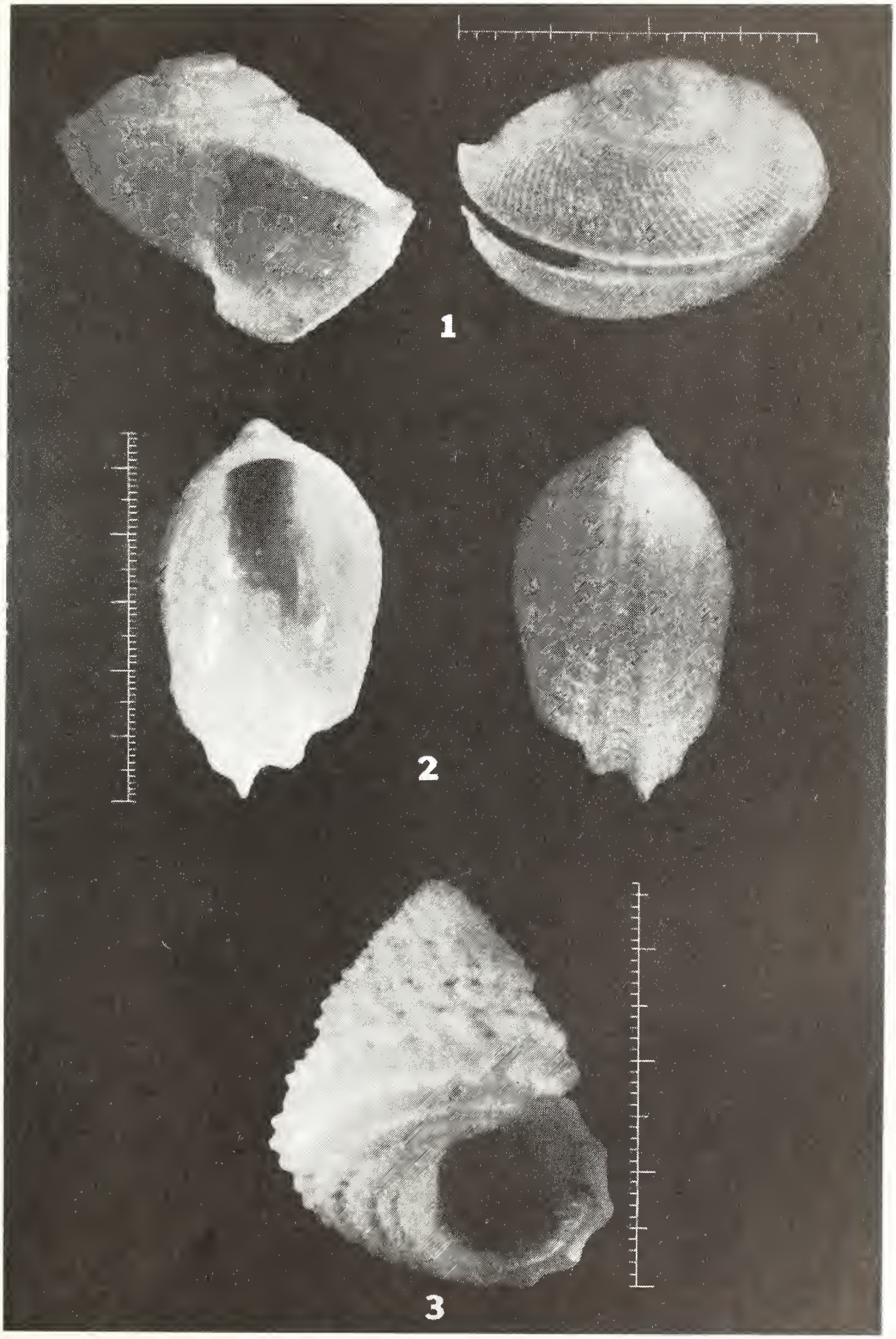
Figures 1 to 3

Figure 1. *Anatoma epicharis* (McLean, 1970a), Holotype (LACM 1370). Diameter: 1.9 mm, height: 1.3 mm. Type locality: Bahía Cartago, Isla Isabela (Isla Albemarle), Islas Galápagos (0°35'S, 90°57'W) in 22 m (12 fm), R/V **Velero III**, bottom sample, sta. 481, 21 Jan. 1938. Remarks: Two specimens were collected. This species is one of the two earliest known tropical eastern Pacific species of the genus *Anatoma* Woodward, 1859. This was originally described as *Scissurella (Anatoma) epicharis*. The specific name is taken from the Greek word for graceful. Photo: B. C. Draper.

Figure 2. *Nesta galapagensis* McLean, 1970c, Holotype (LACM 1307). Length: 5.5 mm, width: 3.3 mm, height: 1.7 mm. Type locality: Tagus Cove, Isla Isabela (Isla Albemarle), Islas Galápagos (0°16'S, 91°22'30"W) in 146-183 m (80-100 fm), R/V **Velero III**, bottom sample, sta. 432, 15 Jan. 1943. Remarks: This is the first reported species of the genus *Nesta* H. Adams, 1870, in the eastern Pacific. It was described from a single specimen. Photo: J. H. McLean.

Figure 3. *Mirachelus galapagensis* McLean, 1970a. Holotype (LACM 1377). Height: 3.6 mm, diameter: 2.9 mm. Type locality: off Canal Bolívar, near Tagus Cove, Isla Isabela (Isla Albemarle), Islas Galápagos (0°16'S,91°22'W) in 73-101 m (40-55 fm). Remarks: The type lot consisting of 12 specimens was dredged by A. & J. DeRoy, 23 Jan. 1968. This is the first eastern Pacific record of the genus *Mirachelus* Woodring, 1928. Many specimens of this species were dredged off Bahía Chatham, Isla del Coco, Costa Rica by Kaiser, Montoya & Shasky from 1984-1992. Photo: B. C. Draper.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Figures 4 to 8

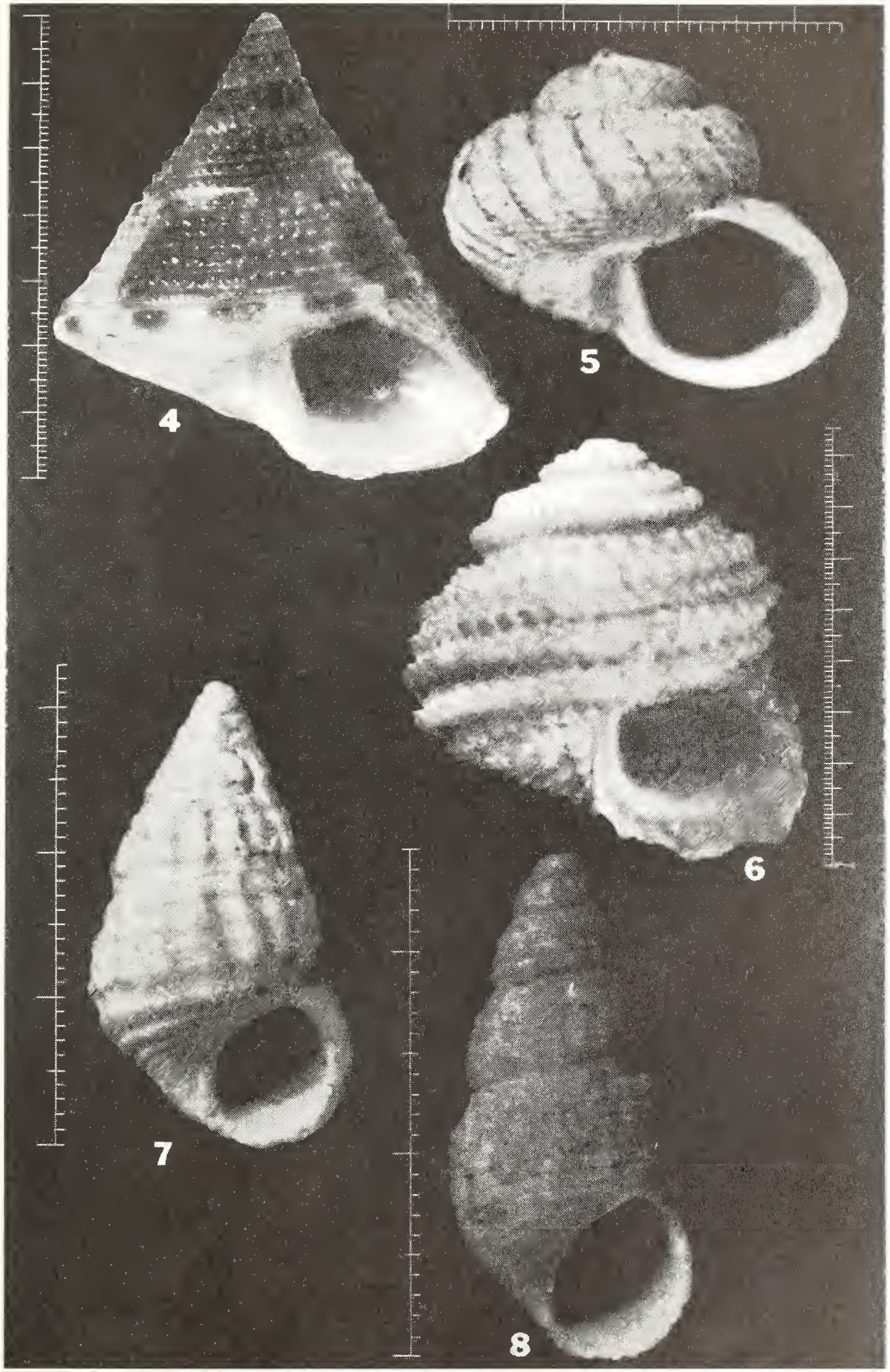
Figure 4. *Calliostoma santacruzanum* McLean, 1970d. Holotype (SDNHM 51301). Height: 7.0 mm, diameter: 6.9 mm. Type locality: South Academy Bay, Isla Santa Cruz, Islas Galápagos (0°45'S,90°20'W), dredged in 45 m by A. & J. DeRoy, 10 June 1968. Remarks: It is the only umbilicate eastern Pacific species other than the low-spired, broadly umbilicate, *C. rema* Strong, Hanna & Hertlein, 1933. J. H. McLean verified two juvenile specimens taken in tangle nets in 440 ft (134 m) in coralline rubble at Chatham Bay, Isla del Coco, April 2, 1992, leg. K. L. Kaiser. Photo: J. H. McLean.

Figure 5. *Brookula (Vetulonia) galapagana* (Dall, 1913). Holotype (USNM 207607). Height: 2.2 mm, diameter: 3.4 mm. Type locality: near the Islas Galápagos in 1159 m (634 fm) in sand, bottom temperature 39.9°F. Remarks: A single specimen collected. This species is similar to the Atlantic *Vetulonia jeffreysi* Dall, 1913. Photo: J. H. McLean.

Figure 6. *Arene (Arene) echinata* McLean, 1970b. Paratype (LACM 1277). Height: 7.2 mm, diameter: 6.5 mm. Type locality: Punta Espinosa, Isla Fernandina, Islas Galápagos (0°16'S,91°27'W), collected by J. DeRoy, 30 Jan. 1968. Remarks: The holotype (AMNH 154626) and the three paratypes were all collected crabbed at low tide. This is the largest eastern Pacific species of the genus and no longer is endemic to the Islas Galápagos. J. H. McLean verified a mature specimen dredged at Isla del Coco, Costa Rica from 150 ft (46 m), sand and light rubble, 26 Mar. 1989, leg. K. L. Kaiser. The rose colored specimen is: height: 4.0 mm, diameter: 4.4 mm. The specific name is Latin for spiny, prickly, and refers to the sculpture. By coincidence, the type locality for the species is Punta Espinosa, meaning thorny in Spanish. Photo: B. C. Draper.

Figure 7. *Lirobarleeia galapagensis* (Bartsch, 1911b). Holotype (USNM 207590). Length: 3.3 mm, diameter: 1.9 mm. Type locality: Station 2808, near the Islas Galápagos, dredged by U.S. Fisheries steamer **Albatross** in 1159 m (634 fm) on coral sand bottom, temperature 39.9°F. Remarks: This was originally described as *Alvania galapagensis*. Photo J. H. McLean.

Figure 8. *Lirobarleeia hoodensis* (Bartsch, 1911b). Holotype (USNM 213687). Length: 2.5 mm, diameter: 1.1 mm. Type locality: Station 2813, off Isla Española (Hood Island), Islas Galápagos, dredged by U.S. Fisheries steamer **Albatross** in 73 m (40 fm) on coral sand bottom, bottom temperature 81°F (believed to be erroneous). Remarks: This was originally described as *Alvania hoodensis*. It was named for Hood Island which has been officially changed to Isla Española (Jackson, 1985). Photo: J. H. McLean.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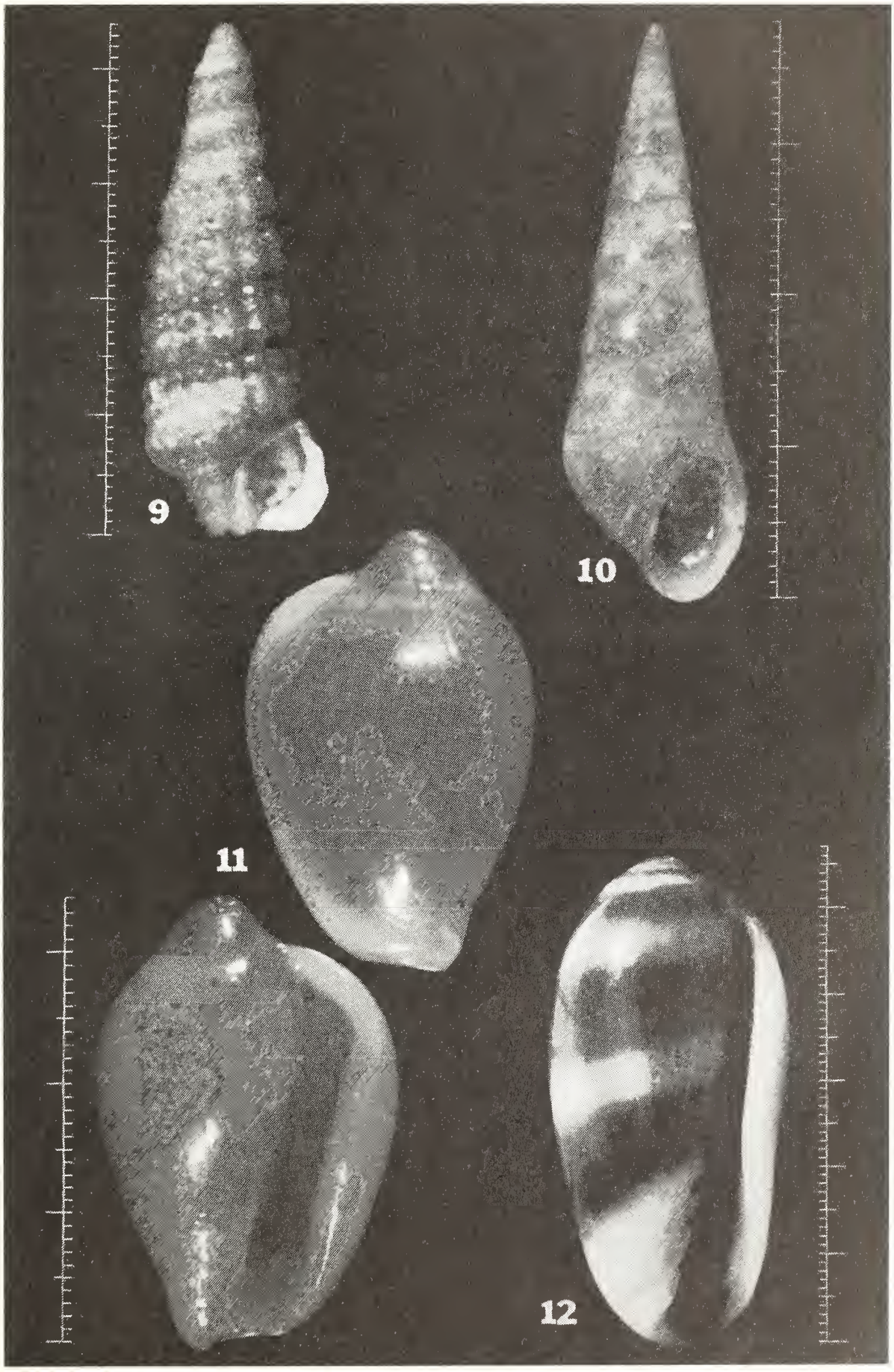
Figures 9 to 12

Figure 9. *Cerithiopsis galapagensis* Bartsch, 1911a. Holotype (USNM 195187). Length: 2.4 mm, diameter: 0.8 mm. Type locality: Station 2813, off the Islas Galápagos, dredged by U.S. Fisheries steamer **Albatross** in 73 m (40 fm) on coral sand bottom, bottom temperature 81°F (believed to be erroneous). Remarks: This species so far remains endemic to the Islas Galápagos. Photo: J. H. McLean.

Figure 10. *Eulimostraca galapagensis* Bartsch, 1917. Holotype (USNM 251281). Length: 3.8 mm, diameter: 1.2 mm. Type locality: Station 2813, off Islas Galápagos, dredged by the U.S. Fisheries steamer **Albatross** in 73 m (40 fm) on coral sand bottom, bottom temperature 80°F (believed to be erroneous). Remarks: This species is no longer restricted to the Islas Galápagos (C. & J. Hertz, 1982). Although the **Albatross** made trips to the Islas Galápagos in the late 1880s, micromollusks collected had not begun to be identified until the early 1900s. Photo: J. H. McLean.

Figure 11. *Hespererato galapagensis* Schilder, 1933. Topotype (LACM 34-288). Length: 3.3 mm. Locality: Tagus Cove, Isla Isabela (Isla Albemarle), Islas Galápagos, in 27 m (0°16'S,91°22'W) by R/V **Velero III**, bottom sample, 9 Dec. 1934. Remarks: Holotype, 2 paratypes, and 1 hypotype figured (Cate, 1977). Photo: B. C. Draper.

Figure 12. *Volvarina (Volvarina) nyssa* Roth & Coan, 1971. Holotype (CAS 13713). Length 5.7 mm, width: 3.0 mm. Type locality: SW side of Isla Pinta (Isla Abingdon), Islas Galápagos (0°31'N, 90°46'W) intertidal, 25 May 1964. Remarks: *V. nyssa* differs from the pink *Volvarina (V.) taeniolata rosa* (Schwengel, 1938) in not having three faintly developed pink-colored bands. Photo: J. H. McLean.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Figures 13 to 16

Figure 13. *Cerodrillia asymmetrica* McLean & Poorman, 1971. Holotype (LACM 1498). Height: 6.1 mm, diameter: 2.7 mm. Type locality: Tagus Cove, Isla Isabela (Isla Albemarle), Islas Galápagos (0°16'08"S,91°22'38"W) 4 specimens dredged by R/V **Velero III** in 18-33 m (10-18 fm), 15 Jan. 1934. Photo: L. H. Poorman.

Figure 14. *Kurtzia humboldti* McLean & Poorman, 1971. Holotype (LACM 1537). Height: 5.2 mm, diameter: 2.1 mm. Type locality: Tagus Cove, Isla Isabela (Isla Albemarle) Islas Galápagos [0°16'08"S, 91°22'38"W] 4 specimens dredged by R/V **Velero III**, in 18-33 m [10-18 fm], 15 Jan. 1934. Remarks: This species was named after the 18th Century naturalist, Alexander Humboldt. The Humboldt Current cools the equatorial waters of the Islas Galápagos. Photo: B. C. Draper.

Figure 15. *Miralda galapagensis* (Dall & Bartsch, 1909). Specimen in K. L. Kaiser collection. Length: 1.5 m. Locality: Isla Rábida, Islas Galápagos (0°25'S,90°42'W) leg. K.L. Kaiser, SCUBA in 15 m from shakings, 18 Feb. 1988. Remarks: Holotype (USNM 206906). Length: 2.0 mm, diameter 0.8 mm. Originally described as *Odostomia (Miralda) galapagensis*. Not endemic to Islas Galápagos (Finet, 1985). Photo: B. C. Draper.

Figure 16. *Transennella galapagana* Hertlein & Strong, 1939. Specimen LACM 72-196. Length: 2.9 mm. Locality: Punta Espinosa, Isla Fernandina, Islas Galápagos, in boulders and sand in 15-30 m, by R/V **Searcher**, 25 Jan. 1972. Remarks: Holotype (CAS Paleo. Type Coll. 6904), Length: 5.9 mm, height: 4.0 mm. *T. galapagana* is known to be found living intertidally in sand in shallow water. This species was described from fossils. Paratypes (CAS Paleo. Type Coll. 6905-6909). Photo: B. C. Draper.

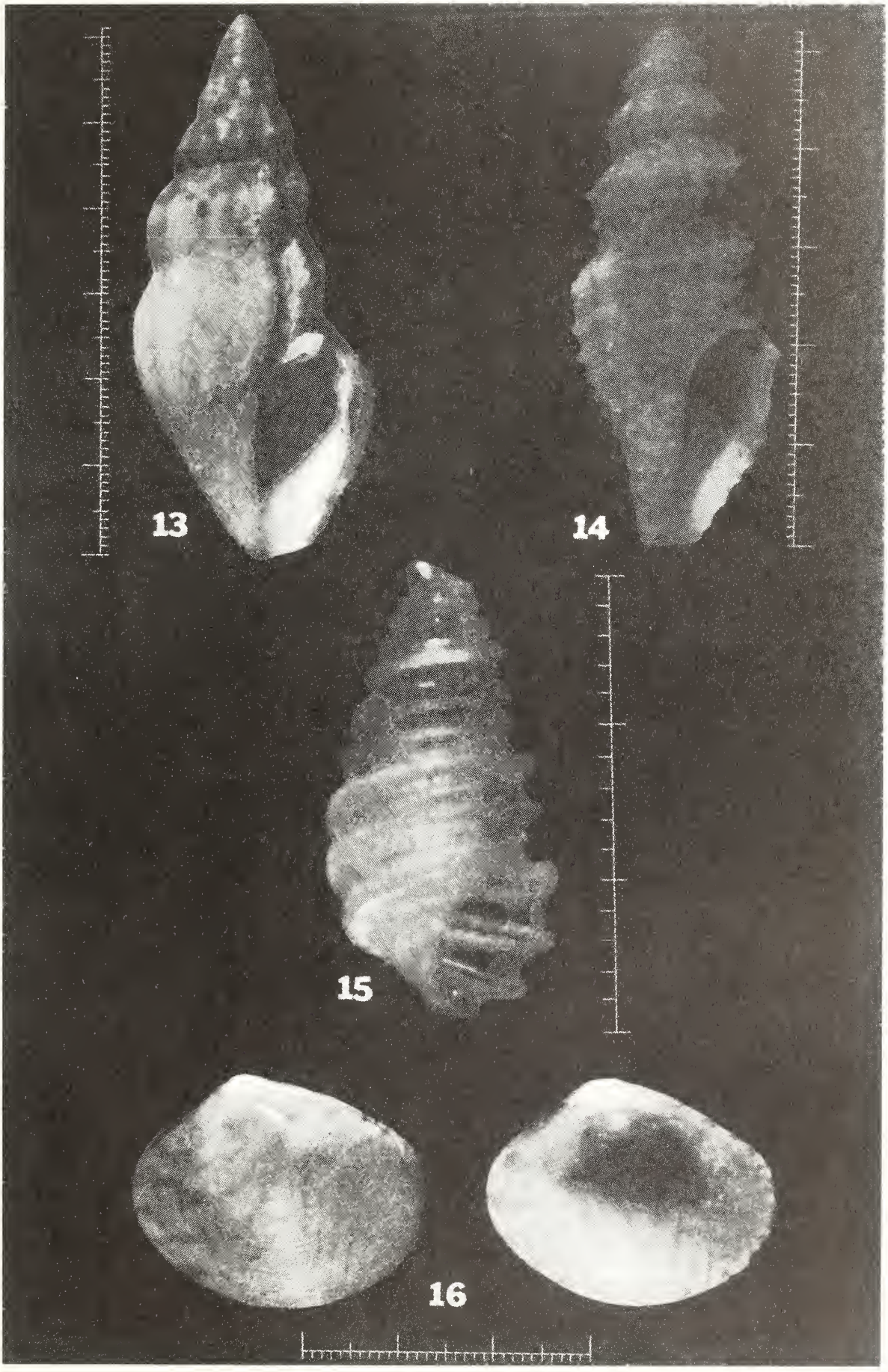
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TABLE 1.

A List of Galapagan Microspecies

Keen No.	List of Species	Literature Sources/Remarks
	POLYPLACOPHORA	
	LEPTOCHITONIDAE	
-	**Leptochiton (Leptochiton) albemarlensis* Smith & Ferreira, 1977	Smith & Ferreira, 1977; Finet, 1991
	ISCHNOCHITONIDAE	
-	**Ischnochiton macleani* Ferreira, 1978	Ferreira, 1978; Finet, 1991
-	*Callistochiton pulchellus* (Gray, 1828)	as: *Callistochiton carmenae* A.G. Smith & Ferreira, 1977 (Ferreira, 1979; Finet, 1991)
42	*Chaetopleura (Chaetopleura) hanselmani* (Ferreira, 1982)	as: *Chaetopleura cf. C. mixta* (Dall, 1919) (Ferreira, 1982; Finet, 1991); as *C. mixta* (Dall) (Keen, 1971)
	ACANTHOCHITONIDAE	
-	*Acanthochitona angelica* Dall, 1919	as: *Acanthochitona jacquelinae* A.G. Smith & Ferreira, 1977 (Finet, 1991); Watters, 1981
-	*Acanthochitona imperatrix* Watters, 1981	Watters, 1981; Finet, 1991
	BIVALVIA	
	ARCIDAE	
70	*Barbatia (Acar) bailyi* (Bartsch, 1931)	Finet, 1991
	MYTILIDAE	
-	*Dacrydium (Quendreda) elegantulum* Soot-Ryen, 1955	Soot-Ryen, 1955
	PROPEAMUSSIIDAE	See Waller (1984).
187	*Cyclopecten exquisitus* Grau, 1959	Keen, 1971; Finet, 1991
189	*Cyclopecten liriope* (Dall, 1908)	Keen, 1971; Finet, 1991
190	*Cyclopecten pernomus* (Hertlein, 1935)	Grau, 1959; Finet, 1991
191	*Cyclopecten polyleptus* (Dall, 1908)	Keen, 1971; Finet, 1991
	CRASSATELLIDAE	
235	*Crassinella varians* (Carpenter, 1857)	Finet, 1991
	KELLIIDAE	
312	*Kellia suborbicularis* (Montagu, 1803)	Finet, 1991
	BERNARDINIDAE	
265	*Halodakra (Halodakra) subtrigona* (Carpenter, 1857)	Finet, 1991
	VENERIDAE	
383	*Gouldia (Gouldia) californica* Dall, 1917	Finet, 1991
392	**Transennella (Transennella) galapagana* Hertlein & Strong, 1939	Keen, 1971; Finet, 1991
	CUSPIDARIIDAE	
776	*Cardiomya californica* (Dall, 1886)	Keen, 1971; Finet, 1991
	GASTROPODA	
	SCISSURELLIDAE	
3	**Anatoma epicharis* (McLean, 1970)	McLean in Keen, 1971; Finet, 1991
5	*Sinezona rimuloides* (Carpenter, 1865)	Shasky, 1989a; Finet, 1991
	FISSURELLIDAE	
10	**Nesta galapagensis* McLean, 1970	McLean in Keen, 1971; Finet, 1991
21	**Diodora punctifissa* McLean, 1970	McLean in Keen, 1971; Finet, 1991
	TURBINIDAE	
126	*Arene echinata* McLean, 1970	McLean in Keen, 1971; Finet, 1991
127	*Arene ferruginosa* McLean, 1970	McLean in Keen, 1971; Finet, 1991
128	*Arene guttata* McLean, 1970	McLean in Keen, 1971; Finet, 1991
159	*Eulithidium diantha* (McLean, 1970)	McLean in Keen, 1971; Finet, 1991
	TROCHIDAE	
67	*Mirachelus galapagensis* McLean, 1970	McLean in Keen, 1971; Finet, 1991
91	*Calliostoma santacruzanum* McLean, 1970	McLean in Keen, 1971; Finet, 1991; at Isla del Coco (collected by K.L. Kaiser)
68	*Solariella diomedea* Dall, 1919	McLean in Keen, 1971; Finet, 1991
72	**Solariella tavernia* Dall, 1919	McLean in Keen, 1971; Finet, 1991
	SKENEIDAE	
117	**Granigyra filosa* Dall, 1919	McLean in Keen, 1971; Finet, 1991
118	**Granigyra piona* Dall, 1919	McLean in Keen, 1971; Finet, 1991
115	**Brookula (Vetulonia) galapagana* (Dall, 1913)	McLean in Keen, 1971; Finet, 1991

	PELYCIDIIDAE	
220	*Pelycidion kelseyi* (Bartsch, 1911)	Draper, 1974a
	LITTORINIDAE	
770	*Nodilittorina (Nodilittorina) angiostoma* (C.B. Adams, 1852)	Finet, 1991
190	*Nodilittorina (Nodilittorina) galapagiensis* (Stearns, 1892)	Keen, 1971; Finet, 1991
191	*Nodilittorina (Nodilittorina) porcata* (Philippi, 1846)	Keen, 1971; Finet, 1991
	RISSOIDAE	
203	*Alvania (Alvania) inconspicua* (C.B. Adams, 1852)	as: *A. monserratensis* Baker, Hanna & Strong, 1930 (Finet, 1991)
210	**Alvania (Alvania) profundicola* Bartsch, 1911	Keen, 1971; Finet, 1991
211	*Alvania (Alvania) tumida* Carpenter, 1857	Finet, 1991
-	*?Alvania chathamensis* Bartsch, MS	Finet, 1991
-	*?Alvania duncani* Bartsch, MS	Finet, 1991
199	**Manzonia (Alvinia) halia* (Bartsch, 1911)	Keen, 1971; Finet, 1991
242	*Rissoina (Rissoina) axeliana* Hertlein & Strong, 1951	J. Hertz, 1976
260	*Rissoina (Rissoina) inca* d'Orbigny, 1840	Keen, 1971; Finet, 1991
263	*Rissoina (Rissoina) laurae* de Folin, 1870	Finet, 1991
271	*Rissoina (Rissoina) stricta* Menke, 1850	Finet, 1991
275	*Folinia cricana* (Hertlein & Strong, 1951)	Shasky, 1989a; Finet, 1991
276	*Folinia insignis* (de Folin, 1867)	Draper, 1974a; Finet, 1991
269	*Schwartziella (Pandalosia) porteri* (Baker, Hanna & Strong, 1930)	Draper, 1974a
	ANABATHRIDAE	
217	*Amphithalamus (Amphithalamus) inclusus* Carpenter, 1864	Shasky, 1989a; Finet, 1991
	BARLEEIDAE	
196	**Lirobarleeia galapagensis* (Bartsch, 1911)	Keen, 1971; Finet, 1991
201	**Lirobarleeia hoodensis* (Bartsch, 1911)	Keen, 1971; Finet, 1991
202	*Lirobarleeia ima* (Bartsch, 1911)	Keen, 1971; Finet, 1991
205	**Lirobarleeia lara* (Bartsch, 1911)	Keen, 1971; Finet, 1991
208	**Lirobarleeia nemo* (Bartsch, 1911)	Keen, 1971; Finet, 1991
-	**Lirobarleeia nigrescens* (Bartsch & Rehder, 1939)	J. Hertz (in press)
	ASSIMINEIDAE	
230	*Assiminea compacta* (Carpenter, 1864)	Keen, 1971; Finet, 1991
	ELACHISINIDAE	
236	*Elachisina johnstoni* (Baker, Hanna & Strong, 1930)	Shasky, 1989a; Finet, 1991
	VITRINELLIDAE	
315	*Cyclostremiscus (Cyclostremiscus) cosmius* (Bartsch, 1907)	Finet, 1991
319	*Cyclostremiscus (Cyclostremiscus) glyptomphalus* Pilsbry & Olsson, 1952	Finet, 1991
343	*Cyclostremiscus (Cyclostremiscus) valvatoides* (C.B. Adams, 1852)	Finet, 1991
349	*Cyclostremiscus (Pachystremiscus) pachynepion* Pilsbry & Olsson, 1945	Draper, 1974b, Finet, 1991
347	*Miralabrum planospiratum* (Carpenter, 1857)	Finet, 1991
351	*Episcynia bolivari* Pilsbry & Olsson, 1946	Finet, 1991
353	*Episcynia nicholsoni* (Strong & Hertlein, 1939)	Finet, 1991
359	*Parviturboides copiosus* (Pilsbry & Olsson, 1945)	Finet, 1991
360	*Parviturboides decussatus* (Carpenter, 1857)	Finet, 1991
379	*Solariorbis (Eulerema) pellucidus* Pilsbry & Olsson, 1952	Finet, 1991
408	*Teinostoma (Pseudorotella) pallidulum* (Carpenter, 1857)	Finet, 1991
	CAECIDAE	
455	*Caecum (Caecum) eburneum* C.B. Adams, 1852	Finet, 1991
466	*Caecum (Caecum) richthofeni* Strong & Hertlein, 1939	Finet, 1991
467	*Caecum (Caecum) semilaeve* Carpenter, 1857	Shasky, 1989a; Finet, 1991
460	*Elephantulum mirificum* (de Folin, 1867)	Finet, 1991
482	*Fartulum (Fartulum) dextroversum* (Carpenter, 1857)	Shasky, 1989a; Finet, 1991
	TORNIDAE	
795	*Macromphalina souverbiei* (de Folin, 1867)	Finet, 1991
	LITIOPIDAE	
560	*Alaba interruptelineata* Pilsbry & Lowe, 1932	J. Hertz, 1977
562	*Alaba supralirata* Carpenter, 1857	Finet, 1991
	PLANAXIDAE	
771	*Fossarus angulatus* Carpenter, 1857	Shasky, 1989a; Finet, 1991
778	*Fossarus megasoma* (C.B. Adams, 1852)	Shasky, 1989a; Finet, 1991
781	*Fossarus purus* Carpenter, 1864	J. Hertz, 1977
782	*Fossarus saxicola* (C.B. Adams, 1852)	Shasky, 1989a; Finet, 1991
	NATICIDAE	
886	**Polinices (Euspira) litorinus* Dall, 1908	Keen, 1971; Marincovich, 1977; Finet, 1991

	TRIVIIDAE	
-	**Trivia artema* (Cate, 1979)	Cate, 1979
904	*Trivia atomaria* (Dall, 1902)	Cate, 1979
-	**Trivia citeria* (Cate, 1979)	Cate, 1979; Finet, 1991
906	*Trivia fusca* (Sowerby, 1832, ex Gray, MS)	Keen, 1971; Cate, 1979; Finet, 1991
-	*Trivia occidentalis* (Schilder, 1922)	Cate, 1979; Finet, 1991
899	*Trivia rubescens* (Gray, 1833)	Keen, 1971; Finet, 1991
913	**Hespercrato galapagensis* Schilder, 1933	Keen, 1971; Finet, 1991
	OVULIDAE	
-	*Delonovolva macleani* Cate, 1976	Cate, 1976
	CERITHIOPSIDAE	
521	**Cerithiopsis bicolor* Bartsch, 1911	Keen, 1971; Finet, 1991
524	*Cerithiopsis curtata* Bartsch, 1911	Keen, 1971; Finet, 1991
526	*Cerithiopsis eiseni* Strong & Hertlein, 1939	Finet, 1991
527	**Cerithiopsis galapagensis* Bartsch, 1911	Keen, 1971; Finet, 1991
529	*Cerithiopsis guanacastensis* Hertlein & Strong, 1951	Shasky, 1989a; Finet, 1991
536	*Cerithiopsis neglecta* (C.B. Adams, 1852)	Keen, 1971; Finet, 1991
557	*Scila assimilata* (C.B. Adams, 1852)	DuShane & Draper, 1975; Finet, 1991
	TRIFORIDAE	
553	**Eumetula eucosmia* Bartsch, 1911	Keen, 1971; Finet, 1991
	TRIPHORIDAE	
571	*Triphora adamsi* Bartsch, 1907	Keen, 1971; Finet, 1991
572	*Triphora alternata* C.B. Adams, 1852	J. Hertz, 1976; Finet, 1991
574	*Triphora chathamensis* Bartsch, 1907	Keen, 1971; Finet, 1991
575	*Triphora contrerasi* Baker, 1926	Finet, 1991
576	*Triphora cookeana* Baker & Spicer, 1935	Finet, 1991
577	*Triphora dalli* Bartsch, 1907	Finet, 1991
578	*Triphora cscondidensis* Baker, 1926	Finet, 1991
579	*Triphora evermanni* Baker, 1926	Finet, 1991
580	*Triphora excolpa* Bartsch, 1907	J. Hertz, 1976; Finet, 1991
581	*Triphora galapagensis* Bartsch, 1907	Keen, 1971; Finet, 1991
582	*Triphora hannai* Baker, 1926	Finet, 1991
587	*Triphora oweni* Baker, 1926	Shasky, 1989a; Finet, 1991
592	*Triphora postalba* Bartsch, 1907	Keen, 1971; Finet, 1991
-	*Triphora triticea* (Pease, 1861)	Shasky, 1989a; Finet, 1991
596	**Triphora unicolor* Bartsch, 1907	Keen, 1971; Finet, 1991
555	*Metaxia convexa* (Carpenter, 1857)	Finet, 1991
	EPITONIIDAE	
611	*Asperiscala acapulcana* (Dall, 1917)	Keen, 1971; Finet, 1991
616	*Asperiscala emydonesa* (Dall, 1917)	Keen, 1971; Finet, 1991
619	*Asperiscala habcli* (Dall, 1917)	Keen, 1971; Finet, 1991
627	**Asperiscala rhytidum* (Dall, 1917)	Keen, 1971; Finet, 1991
661	*Nitidiscala willetti* (Strong & Hertlein, 1937)	Finet, 1991
	EULIMIDAE	
755	**Eulima (Eulima) chathamensis* (Bartsch, 1917)	Keen, 1971; Finet, 1991
694	*Eulima (Eulima) elegantissima* de Folin, 1867	Finet, 1991
756	**Eulima (Eulima) meridionalis* (Bartsch, 1917)	Keen, 1971; Finet, 1991
720	*Melanella (Balcis) falcata* (Carpenter, 1865)	Finet, 1991
729	**Melanella (Balcis) ochsneri* Bartsch, 1917	Keen, 1971; Finet, 1991
693	*Eulimostraca burragei* (Bartsch, 1917)	as: *Balcis panamensis* (Bartsch, 1917) (Finet, 1991); Warén, 1992
743	*Eulimostraca galapagensis* Bartsch, 1917	Keen, 1971; Finet; 1991
-	*Sabinella shaskyi* Warén, 1992	Warén, 1992
760	*Stilifer (Stilifer) astericola* Broderip, 1832	Keen, 1971; Finet, 1991
	BUCCINIDAE	
-	*Cantharus (Pollia) fumosus* (Dillwyn, 1817)	Shasky, 1988; Finet, 1991
1297	**Nassarius exsarcus* (Dall, 1908)	Keen, 1971; Finet, 1991
1301	**Nassarius goniopleura* (Dall, 1908)	Keen, 1971; Finet, 1991
1313	*Nassarius nucleolus* (Philippi, 1846)	as: *N. taeniolatus* (Philippi, 1846) (Finet, 1991)
1313a	**Nassarius townsendi* (Dall, 1890)	Keen, 1971; Finet, 1991
	COLUMBELLIDAE	
1161	*Columbella sonsonatensis* (Mörch, 1860)	as: *C. festiva* Kiener, 1841 (Finet, 1991)
1198	*Costoanachis atramentaria* (Sowerby, 1844)	Keen, 1971; Finet, 1991

1186	*Costoanachis nigricans* (Sowerby, 1844)	Keen, 1971; Finet, 1991
1193	*Costoanachis teevani* (Hertlein & Strong, 1951)	Finet, 1991
1213	*Zafrona incerta* (Stearns, 1892)	Keen, 1971; Finet, 1991
1250	*Steironepion hancocki* (Hertlein & Strong, 1939)	Keen, 1971; Finet, 1991
1251	*Steironepion melanosticta* (Pilsbry & Lowe, 1932)	Finet, 1991
	MARGINELLIDAE	
-	*Dentimargo anticlea* (Dall, 1919)	Roth, 1978
1401	**Dentimargo erema* (Dall, 1919)	Coan & Roth in Keen, 1971; Finet, 1991
1406	*Persicula phrygia* (Sowerby, 1846)	Coan & Roth in Keen, 1971; Finet, 1991
-	**Volvarina (Volvarina) innexa* Roth, 1978	Roth, 1978
1407	**Volvarina (Volvarina) nyssa* Roth & Coan, 1971	Roth & Coan, 1971; Finet, 1991
1409	**Volvarina (Volvarina) taeniolata rosa* (Schwengel, 1938)	Coan & Roth in Keen, 1971; Finet, 1991
1408	*Volvarina (Volvarina) taeniolata taeniolata* Mörch, 1860	J. Hertz, 1977; Finet, 1991
1413	*Granula insularum* Roth & Coan, 1971	Roth & Coan, 1971; Finet, 1991
1414	*Granula minor* (C.B. Adams, 1852)	Coan & Roth in Keen, 1971; Finet, 1991
1415	*Granula polita* (Carpenter, 1857)	Finet, 1991
1417	*Granulina margaritula* (Carpenter, 1857)	Coan & Roth in Keen, 1971; Finet, 1991
	TURRIDAE	
1607	*Leptadrillia firmichorda* McLean & Poorman, 1971	Finet, 1991
1633	**Cerodrillia asymmetrica* McLean & Poorman, 1971	McLean in Keen, 1971; Finet, 1991
1651	*Cryptogemma eldorana* (Dall, 1908)	McLean in Keen, 1971; Finet, 1991
1766	*Microdrillia zeuxippe* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1770	*Mitromorpha carpenteri* Glibert, 1954	McLean in Keen, 1971; Finet, 1991
1774	*Clathurella maryea* McLean & Poorman, 1971	McLean in Keen, 1971; Finet, 1991
1776	*Clathurella rigida* (Hinds, 1843)	Shasky, 1989a; Finet, 1991
1814	**Kurtzia humboldti* McLean & Poorman, 1971	McLean in Keen, 1971; Finet, 1991
1817	*Agathotoma (Agathotoma) camarina* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1835	*Ithycythara penelope* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1865	**Gymnobela brachis* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1846	*Kermia informa* McLean & Poorman, 1971	McLean in Keen, 1971; Finet, 1991
1848	*Microdaphne trichodes* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1858	**Pleurotomella hermione* (Dall, 1919)	McLean in Keen, 1971; Finet, 1991
1845	**Truncadaphne stonei* (Hertlein & Strong, 1939)	McLean in Keen, 1971; Finet, 1991
1847	*Veprecula tornipila* McLean, & Poorman, 1971	McLean in Keen, 1971; Finet, 1991
	RISSOELLIDAE	
238	*Rissoella tumens* (Carpenter, 1857)	Shasky, 1984; Finet, 1991
	ARCHITECTONICIDAE	
-	*Heliacus (Torinista) planispira* Pilsbry & Lowe, 1932	as: *H. caelatus* (Hinds, 1844) (Finet, 1991); Skoglund, 1992a
430	*Heliacus mazatlanicus* Pilsbry & Lowe, 1932	Keen, 1971; Finet, 1991
	PYRAMIDELLIDAE	
1903	*Chrysallida clathratula* (C.B. Adams, 1852)	J. Hertz, 1977
1940	*Chrysallida rinella* (Dall & Bartsch, 1909)	Finet, 1991
-	*Herviera gliriella* (Melvill & Standen, 1896)	Shasky, 1989a; Finet, 1991
1970	**Evalea parella* (Dall & Bartsch, 1909)	Keen, 1971; Finet, 1991
1985	*Ividella navisa* (Dall & Bartsch, 1907)	Finet, 1991
2053	*Cingulina evernanni* (Baker, Hanna & Strong, 1928)	Shasky, 1989a; Finet, 1991
1995	*Menestho grijalvae* (Baker, Hanna & Strong, 1928)	Shasky, 1989a; Finet, 1991
2006	*Miralda galapagensis* (Dall & Bartsch, 1909)	Keen, 1971; Finet, 1991
2023	*Triptychus incantatus* (Hertlein & Strong, 1939)	Finet, 1991
2043	**Turbonilla (Chemnitzia) houseri* Dall & Bartsch, 1909	Keen, 1971; Finet, 1991
2050	*Turbonilla (Chemnitzia) sinaloana* Strong, 1949	Shasky, 1989a; Finet, 1991
2160	**Turbonilla (Pyrgiscus) shimeki* Dall & Bartsch, 1909	Keen, 1971; Finet, 1991
2200	**Turbonilla (Strioturbonilla) galapagensis* Dall & Bartsch, 1909	Keen, 1971; Finet, 1991
	ACTEONIDAE	
2234	**Microglyphis perconicus* (Dall, 1890)	Keen, 1971; Finet, 1991
	CYLICHNIDAE	
2265	*Cylichna luticola* (C.B. Adams, 1852)	Finet, 1991
	BULLIDAE	
2238	*Bulla (Leucophysema) morgana* Dall, 1908	J. Hertz, 1977
	RETUSIDAE	
2247	**Sulcoretusa galapagana* (Dall, 1919)	Keen, 1971; Finet, 1991

2249	*Volvulella (Volvulella) catharia* Dall, 1919	Abbott, 1974; Finet, 1991
2250	*Volvulella (Volvulella) cylindrica* (Carpenter, 1864)	Keen, 1971; Finet, 1991
	JULIIDAE	
2315	*Julia thecaphora* (Carpenter, 1857)	Shasky, 1989a; Finet, 1991
2316	*Berthelinia (Edenttellina) chloris* (Dall, 1918)	Sphon & Mulliner, 1972; Finet, 1991
	APLYSIIDAE	
2303	*Dolabrifera dolabrifera* (Rang, 1828)	Sphon & Mulliner, 1972; Ferreira & Bertsch, 1975; Finet, 1991
	TYLODINIDAE	
2308	*Berthellina engeli* Gardiner, 1936	Bertsch, 1970; Finet, 1991
	PLEUROBRANCHIDAE	
2306	*Pleurobranchus areolatum* (Mörch, 1863)	Bertsch & Smith, 1973; Finet, 1991
	CAVOLINIIDAE	
2274	*Cavolinia globulosa* (Gray, 1850 *ex* Rang, MS)	Keen, 1971; Finet, 1991
2275	*Cavolinia inflexa* (Lesueur, 1813)	Keen, 1971; Finet, 1991
2283	*Diacria quadridentata* (Blainville, 1821, ex Lesueur, MS)	Shasky, 1989a; Finet, 1991
	MELAMPIDAE	
2409	**Tralia vanderbilti* Schwengel, 1938	Keen, 1971; Finet, 1991
2410	*Pedipes angulatus* C.B. Adams, 1852	Keen, 1971; Finet, 1991
	SCAPHOPODA	
	PULSELLIDAE	
12	*Compressidens brevicornu* (Pilsbry & Sharp, 1897)	Keen, 1971; Finet 1991

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Three Weeks in the South Pacific

Carole and Jules Hertz together with Carol and Paul Skoglund, spent three weeks in Tonga and Western Samoa. The Hertzes will give a slide show on the trip and display shells from the area.

Election of Officers for 1994

Shells of the month: Terebras
Meeting date: November 18th

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - October 21, 1993

The meeting was called to order by President Carole Hertz at 7:40 PM. After introduction of guests, the minutes were accepted as published in **The Festivus**.

The slate of officers for 1994 as selected by the nominating committee was presented: President, Hugh Bradner; Vice President, Larry Buck; Recording Secretary, Rick Negus; Corresponding Secretary, Kay Klaus; Treasurer, Margaret Mulliner. Nominations from the floor will be accepted prior to the election at the November meeting. Installation of officers takes place at the Christmas party.

Don Pisor announced that the 1995 COA Convention will be hosted by the San Diego Shell Club in June 1995. Don, who will be chairman, made an initial call for participation. Seven to nine people are needed for chairpersons. Contact Don (279-9342) if you are interested in helping .

Jules Hertz introduced speaker Jeff Crooks, a doctoral student at Scripps Institution of Oceanography, who spoke on Aliens in the Bay: the Invasion of Exotic Mollusks in California Waters. Jeff showed charts of the large number of mollusks introduced into west coast waters both intentionally and unintentionally. The talk was illustrated with photographs from Mission Bay showing the invasion of the mytilid *Musculina senhousia* which makes muddy nests and has carpeted the areas in which it has settled displacing the native bivalves.

Before refreshments, a mini-auction of books was held. Refreshments were provided by Nancy Schneider, John Jackson and Larry Buck. The door prize was won by Tom Knapik.

The Club's Christmas Dinner Party

The San Diego Shell Club's annual Christmas Dinner Party will be held on Saturday evening December 4th at the Guadalajara Grill in Old Town (4105 Taylor St.). The menu will include salad, fajitas (combos with chicken, beef, shrimp), tortillas, rice and beans, flan and coffee. The Club will provide the dinner wine. The cost is $15.00 per person which includes tax and gratuities.

Festivities will begin at 6:00 PM with no host cocktails. Dinner will be at 7:00 PM. Following the Club program, there will be dancing in the main part of the restaurant.

Paid reservations must be received by November 30th. Make checks payable to the San Diego Shell Club. Send either to the Club address or to treasurer Margaret Mulliner, 5283 Vickie Dr., San Diego, 92109.

The Clipperton Expedition - 1994

A few spaces are still available on this research expedition to Clipperton Island in the eastern Pacific. The trip, focusing on underwater faunas, is scheduled for April 7 through May 7 with possible options of "late fly-down departure and early fly-back return."

The trip aboard the "Royal Star," a 92-foot long-range sportfishing boat which will be equipped to handle SCUBA diving, will have a total of 18 persons. Stops will be made at Rocas Alijos, Isla San Benedicto, Roca Partida and Isla Clarion enroute to isolated Clipperton Island, with a scheduled visit to Isla Socorro on the return trip.

If you are interested in exploring Clipperton Island, an "overlap" zone containing both tropical eastern Pacific faunal amd Indo-Pacific faunal elements, contact John Jackson for further information. Phone: (619) 570-8405, FAX (619) 579-7901 or write to him at 11558 Rolling Hills Dr., El Cajon, CA 92020.

Dues are Due

Dues for 1994 are now due and payable to the San Diego Shell Club. Please send to the Club address shown on the masthead. All domestic memberships are $12; overseas (surface mail) $15; overseas (air mail) $30. Dues must be received by the end of January for inclusion on the 1994 roster.

SHELL COLLECTING ON CHRISTMAS ISLAND

JOHN A. BISHOP

3026 Freeman Street, San Diego, California 92106

I have a friend, an ardent flyfisherman, who goes to Christmas Island each year to fish for bonefish. I am not a flyfisherman, but his description of the island led me to believe that it would be an unusual and interesting place for shell collecting and I quickly accepted his invitation to join him in January of this year. We met at the Air Nauru counter of the Honolulu Airport at 8:30 A.M. on January 19, 1993 and boarded a Boeing 737 for a comfortable 2½ hour flight to Christmas Island. There were only 30 passengers on board, 20 flyfishermen from the colder northern climes of the United States, 10 government officials, and me. Air Nauru flies only once a week, leaving on Tuesday mornings and returning the following Monday--so stays there come only in multiples of one week.

Christmas Island lies 1335 miles due south of Hawaii, 1450 miles north of Tahiti, and just 2 degrees north of the equator [2°00'N, 157°20'W). It is the world's largest atoll, triangular in shape, 20 miles across the base, 40 miles long, (Figures 1 & 2) with a large shallow central lagoon full of ponds and sandy islands (Figure 3). Rainfall averages about 30 inches per year, but the soil is so poor that there are only a limited variety of plants that will grow there - mainly a 10 to 12 foot high bushy tree of the Heliotrope family and thousands of coconut palms. The latter were all planted by previous inhabitants and cover about half of the land area. There is only one native land bird - the Christmas Island Warbler, a secretive little brown bird which is difficult to see. Before leaving on the trip I made an effort to review current publications on the malacology of the island with negative results. However, there are 18 species of sea birds that nest there and they have been studied extensively since 1954. In 1977 a Wildlife Conservation Unit was established on the island and now the birds are protected by law from any molestation (Schreiber & Ashmole, 1970; Trussel & Fujii, 1988).

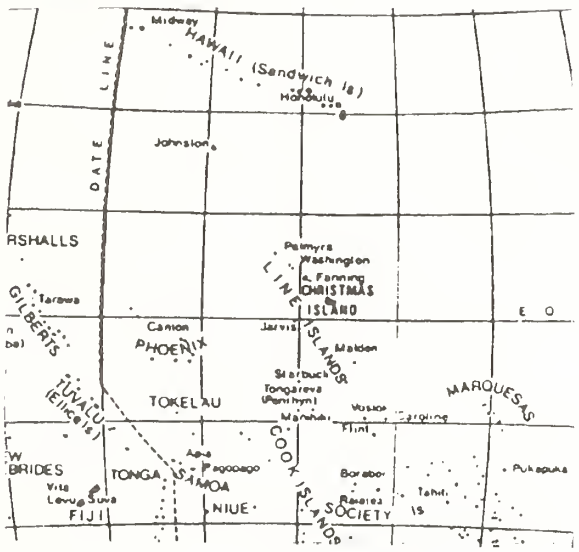

Figure 1. Detail of map showing Christmas Island.

The island was named by Captain James Cook who arrived there on December 24, 1777. He remained for two to three weeks to provision his ship with the plentiful turtles that he found, and to record a solar eclipse that occurred on January 1, 1778. During the 1800s the island was occupied for various periods by the United States, British, and Japanese interests. In 1907 it was bought by Father Emmanual Rougier, a French priest, who after being left a considerable sum of money, gave up his priestly duties and moved to Christmas Island to become a coconut plantation owner. He was responsible for the unusual place names on the island such as Paris, London, Poland, and Banana. The island was taken over by the Allied Forces during the second World War and is still littered with rusting military debris. In 1957-58 and in 1962 it was used by the British and the United States for a series of high altitude nuclear bomb tests. The island was not evacuated at the time and a survey of radioactivity in 1975 reported only normal levels

Figure 2. Christmas Island, Pacific Ocean.

of radiation (Bailey, 1977).

After the second World War the island was part of the Gilbert Islands, a British Colony. In 1979 they were given their independence and now are known as the Republic of Kiribati. The island now has a population of about 1600 people of Micronesian origin whose main occupations are producing copra and catering to visiting bonefishermen. There is only one hotel, the "Captain Cook." It was constructed in 1976 and has rooms and bungalows for 50 guests. The rooms were comfortable and the food was good.

Each morning at 5:30 A.M. my fishing friends departed to fish for bonefish on the shoals of the sandy islands in the central lagoon (Figure 3) leaving me to my own devices. I spent the first day exploring the beach adjacent to the hotel. I discovered that diving in the area was impossible due to the high surf

Figure 3. Christmas Island's large central lagoon from the air.

breaking over the fringing reef which was only 30-50 yards offshore. However, the beach which was composed of coral sand and rubble (Figure 4), contained many crabbed and drift shells such as cones, cowries, thaids, bursas, etc., and a number of well-preserved *Harpa amouretta*. The second day I decided to go by punt with the fishermen to the island in the lagoon. While they were fishing I wandered about collecting shells and photographing the nesting sea birds. I found six different ceriths, a variety of bivalves and an abundance of *Planaxis sulcatus*, a common littorine. The sea birds were easily approached, much like those on the Galapagos Islands. They were nesting on the ground or in low bushes or trees and I was able to photograph Red-footed and Masked Boobies, Black Noddies, Sooty Therns, and Greater Frigates.

In order to find a diving area it was necessary to go by truck to the leeward side of the island, a distance of 10 miles from the hotel. The water there was great--no surf, 86 degrees Fahrenheit, and 50 plus feet of visibility. Under the rocks and in the coral crevices of the inshore reef I found cones, cowries and bursas. There were also a good number of *Latirus amplustris*, noted in the **Compendium of Seashells** by Abbott & Dance as being uncommon. In addition, I found three nice specimens of *Mitra stictica* by following sand trails in an area of sand between fingers of the coral reef at a depth of 25 feet.

Table 1 is a listing of the 70 different species of shells that I collected. About 25 are new to my collection and they, in general, seem more similar to the fauna of Tahiti than Hawaii; there being 18 of the species not found in Hawaii.

Each entry is preceded by an abbreviation and page number which denote the authority consulted and page (A=Abbott & Dance, 1986; H=Houbrick, 1992; K=Kay, 1979; S=Salvat & Rives, 1984). An asterisk before an entry indicates those species not found in Kay (1979).

My sincere thanks to Carole and Jules Hertz for reviewing the collection and helping me identify a number of the shells.

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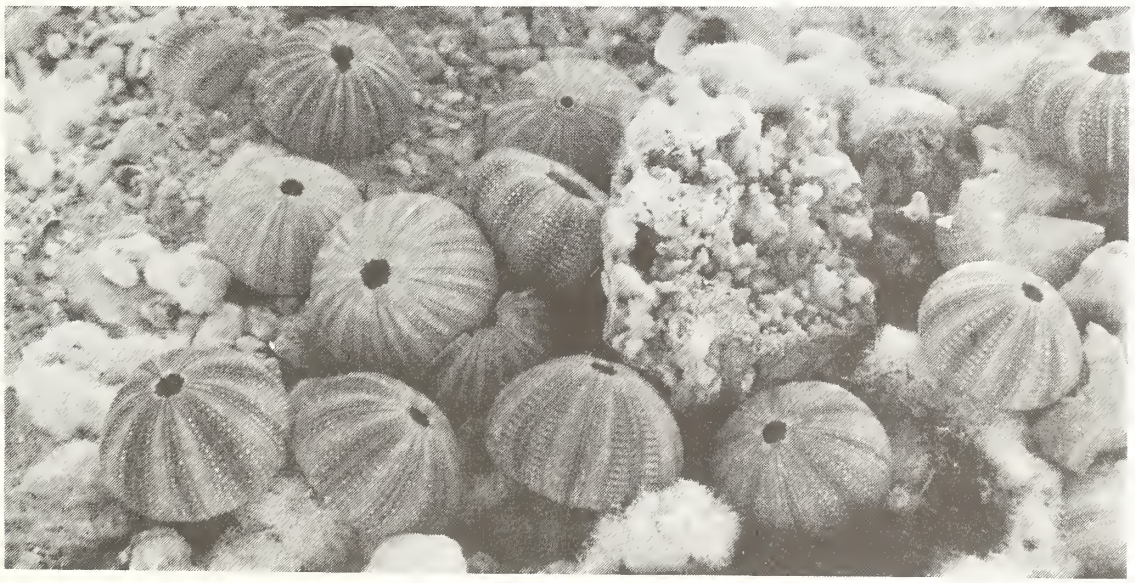

Figure 4. On a beach at Christmas Island about one mile east of the Captain Cook Hotel.

TABLE 1

SHELLS COLLECTED AT CHRISTMAS ISLAND
January 19-26, 1993

Source	Species Collected
	Gastropods
K-52	*Trochus intextus* Kiener, 1850
A-46	**Turbo argyrostomus* Linnaeus, 1758
S-74	**Astraea rhodostoma* (Lamarck, 1822)
K-63	*Nerita plicata* Linnaeus, 1758
A-62	*Planaxis sulcatus* (Born, 1788)
K-121	*Ceritlıium columna* Sowerby, 1834
H-116	**Ceritlıium munitum* Sowerby, 1855 (This species has been reported from Palmyra but not Christmas Island (Houbrick, 1992). Five beach specimens found.)
K-125	*Rhinoclavis aspera* (Linnaeus, 1758)
K-124	*Rhinoclavis sinensis* (Gmelin, 1791)
A-67	**Clypeomorus brevis* (Quoy & Gaimard, 1834)
A-77	**Strombus mutabilis* Swainson, 1821
K-189	*Cypraea caputserpentis* Linnaeus, 1758
K-191	*Cypraea carneola* Linnaeus, 1758
A-97	**Cypraea depressa* Gray, 1824
K-192	*Cypraea erosa* Linnaeus, 1758
K-193	*Cypraea isabella* Linnaeus, 1758
K-196	*Cypraea moneta* Linnaeus, 1758
K-197	*Cypraea poraria* Linnaeus, 1758
K-199	*Cypraea scurra* Gmelin, 1791
K-200	*Cypraea talpa* Linnaeus, 1758
K-200	*Cypraea teres* Gemlin, 1791
K-202	*Cypraea vitellus* Linnaeus, 1758
K-208	*Polinices melanostomus* (Gmelin, 1791)
K-220	*Cymatium aquatile* (Reeve, 1844)
K-216	*Cymatium nicobaricum* (Röding, 1798)
K-217	*Cymatium muricinum* (Röding, 1798)
K-223	*Distorsio anus* (Linnaeus, 1758)
K-226	*Bursa bufonia* (Gmelin, 1791)
K-227	*Bursa granularis* (Röding, 1798)
K-233	*Tonna perdix* (Linnaeus, 1758)
K-241	*Drupa grossularia* (Röding, 1798)
K-241	*Drupa morum* Röding, 1798
K-241	*Drupa ricina* (Linnaeus, 1758)
K-248	*Morula granulata* (Duclos, 1832)
K-249	*Nassa serta* (Bruguière, 1789) (fragment)
K-249	*Neothais harpa* (Conrad, 1837)
K-251	*Thais armigera* (Link, 1807)
	Thais sp. undetermined
K-258	*Quoyula madreporarum* (Sowerby, 1834)
A-171	**Cantharus undosus* (Linnaeus, 1758)
A-181	**Nassarius graniferus* (Kiener, 1834)
	Nassarius sp. undetermined
K-275	*Nassarius papillosus* (Linnaeus, 1758)
A-184	**Latirus amplustris* (Dillwyn, 1817)
A-184	*Latirus iris* (Lightfoot, 1786)
K-284	*Harpa amouretta* Röding, 1798
K-296	*Mitra stictica* (Link, 1807)
K-299	*Mitra coronata* Lamarck, 1811
K-303	*Mitra acuminata* Swainson, 1824
K-304	*Mitra pellisserpentis* Reeve, 1844
A-209	**Vasum turbinellus* (Linnaeus, 1758)
K-370	*Conus chaldeus* (Röding, 1798)
K-371	*Conus ebraeus* Linnaeus, 1758
K-374	*Conus lividus* Hwass in Bruguière, 1792
K-379	*Conus rattus* Hwass in Bruguière, 1792
A-248	**Conus scabriusculus* Dillwyn, 1817
K-380	*Conus sponsalis* Hwass in Bruguière, 1792
A-247	*Conus tulipa* Linnaeus, 1758
K-397	*Terebra crenulata* (Linnaeus, 1758)
K-423	*Bulla vernicosa* Gould, 1859
	Bivalvia
S-140	**Modiolus auriculatus* Krauss, 1848
A-302	*Isognomon perna* (Linnaeus, 1767)
A-329	**Fragum fragum* (Linnaeus, 1758)
A-333	**Tridacna maxima* (Röding, 1798)
A-343	*Tellina scobinata* Linnaeus, 1758 (Abbott & Dance (1986) consider *T. elizabethae* Pilsbry, 1918 as a synonym.)
A-347	**Asaphis violascens* (Förskaal, 1775)
A-351	*Trapezium oblongum* (Linnaeus, 1758)
A-353	**Periglypta chemnitzi* (Hanley, 1844)
A-353	**Periglypta reticulata* (Linnaeus, 1758)
A-354	**Gafrarium pectinatum* (Linnaeus, 1758)

NEW DISTRIBUTIONAL INFORMATION FOR PANAMIC PROVINCE ARCHAEOGASTROPODA (MOLLUSCA)

CAROL SKOGLUND and ROBERT KOCH

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Keen (1971) gave the known distribution for most shells in the Panamic Province. Skoglund (1992), using the same geographic limits proposed by Keen, brought published range extension information up to date.

Numerous taxonomic changes have been made since Keen's treatise was published. These changes are listed in Skoglund (1992). **Bold** type was used in Skoglund and is used herein to indicate these changes and for new species not included in Keen's book. Where possible, the same numbering system has been used. Koch (1993) updated the geographical locations for Skoglund (1992).

The following previously unpublished geographic and bathymetric distributions have been taken from material in the Skoglund (S) and Koch (K) collections. All citations are based on examination of shells by both of us with agreement on identification of the species involved. All shells were dead taken except as noted.

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4. ***Anatoma keenae*** (McLean, 1970). Extend distribution north in the Gulf of California from Isla Raza to off Isla Smith, Bahía de los Angeles, Baja California, Mexico (S).

5. *Sinezona rimuloides* (Carpenter, 1865). Extend distribution north in the Gulf of California from Guaymas, Sonora, to off Isla San Jorge, Sonora, Mexico (K).

6. *Emarginula tuberculosa* Libassi, 1859. Extend distribution north from Colombia to off Isla Danzante, Gulf of California, Mexico (S).

9. *Henitoma (Montfortia) hermosa* Lowe, 1935. Extend distribution northwest from Guaymas, Sonora, across the Gulf of California to off Isla Smith, Bahía de los Angeles, Baja California, Mexico. Live, attached to small stones (S).

-- ***Rimula californiana*** Berry, 1964. Extend distribution from the Pacific side of Baja California to off Isla Danzante, Gulf of California, Mexico (K).

18. *Diodora inaequalis* (Sowerby, 1835). Extend distribution from the Gulf of California to the Pacific coast of Baja California at Estero San José, near Guerrero Negro, Baja California Sur, Mexico, which is north of the Panamic Province. Live intertidal (K).

26. *Lucapinella crenifera* (Sowerby, 1835). Extend distribution north from Ecuador to Isla Jesusita, Gulf of Nicoya, Costa Rica, intertidal (S).

27. *Lucapinella eleanorae* McLean, 1967. Extend distribution north from Guaymas to Bahía la Cholla, Sonora, Mexico (S).

29. *Stromboli beebei* (Hertlein & Strong, 1951). Extend distribution north from Bahía Concepción, Baja California Sur, to off Isla Smith, Bahía de los Angeles, Baja California and east across the Gulf of California to off Punta San Antonio, north of Bahía San Carlos, Sonora, Mexico (S).

-- ***Fissurella (Fissurella) volcano*** Reeve, 1849. Extend distribution south from Bahía Magdalena into the Gulf of California at Los Frailes, Baja California Sur, Mexico (K)

43. *Leurolepas roseola* McLean, 1970. Extend distribution north in the Gulf of California

from Isla Espíritu Santo to Bahía de los Angeles, Baja California Mexico. Live, attached to small rocks (S).

56. ***Tectura*** *fascicularis* (Menke, 1851). Include Bahía de los Muertos, Baja California Sur, Mexico, in distribution. Live, intertidal (K).

60. ***Lottia*** *mesoleuca* (Menke, 1851). Include Isla Socorro, Islas Revillagigedo, Mexico, in distribution. Live, intertidal (K).

69. *Solariella elegantula* Dall, 1925. Extend distribution across the Gulf of California from Guaymas, Sonora, to off Bahía Concepción, Baja California Sur, Mexico (K).

71. *Solariella* ***(Minolia)*** *peramabilis* Carpenter, 1864. Include off Isla Smith, Bahía de los Angeles, Baja California, Mexico, in distribution. Live, in mud at 183 m (S).

73. *Solariella triplostephanus* Dall, 1910. Include off Bahía San Carlos, Sonora, Mexico, in distribution. Live, depth to 66 m (S, K).

83. *Calliostoma keenae* McLean, 1970. Extend distribution north in the Gulf of California from Cabo San Lucas to off Los Frailes, Baja California Sur (K), off Isla Danzante (S) and off Bahía de los Angeles, Baja California, Mexico (S).

86. *Calliostoma mcleani* Shasky & Campbell, 1964. Extend distribution west across the Gulf of California to off Bahía de los Angeles, Baja California, Mexico (S). This distribution was noted by Shasky and Campbell (1964). Include off Isla Danzante, Gulf of California (S) and off Los Frailes, Baja California Sur (K), in distribution.

93. *Tegula (Tegula) pellisserpentis* (Wood, 1828). Include the Islas Las Perlas, Panama, in distribution (K).

95. *Tegula (Agathistoma) bergeroni* McLean, 1970. Include the Islas Las Perlas, Panama, in distribution. Live, intertidal (K). This distribution was noted by McLean (1970).

103. *Tegula (A.) ligulata mariamadre* Pilsbry & Lowe, 1932. Extend distribution north from Cabo San Lucas to Bahía Playa Marias on the Pacific side of Baja California, Mexico, which is north of the Panamic Province. Live taken (K).

111. *Tegula (A.) verdispira* McLean, 1970. Extend distribution southeast from Islas Tres Marias to the Mexican mainland at La Cruz de Huanacaxtle, Bahía Banderas, Nayarit (S).

119. *Haplocochlias cyclophoreus* Carpenter, 1864. Extend distribution north in the Gulf of California from Isla Espíritu Santo, to off Isla Danzante, Gulf of California (S, K).

120. *Haplocochlias lucasensis* (Strong, 1934). Extend distribution south from Isla Socorro, Islas Revillagigedo, Mexico, to Bahía Drake, Puntarenas Province, Costa Rica. Depth: 10 to 25 m (K).

127. *Arene (Arene) ferruginosa* McLean, 1970. Extend distribution from north of Acapulco, Guerrero, Mexico, north to off Los Frailes, Baja California Sur (S, K), and Isla Danzante (S) and Isla Smith, Bahía de los Angeles (S), Baja California, Mexico. Depth: 60 to 120 m.

131. *Arene (A.) olivacea* (Dall, 1918). Include the Islas Las Perlas, Gulf of Panama in distribution. Live, intertidal (S, K).

141. *Homalopoma (Panocochlea) clippertonense* (Hertlein & Emerson, 1953). Extend distribution from Isla San Pedro Nolasco northwest across the Gulf of California to off Isla Smith, Bahía de los Angeles, Baja California (S).

142. *Homalopoma (P.) grippi* (Dall, 1911). Extend distribution from Cabo San Lucas into the Gulf of California to off Los Frailes, Baja California Sur, Mexico. Live taken (K).

146. *Turbo (Callopoma) saxosus* Wood, 1828. Include the Islas Las Perlas, Panama, in distribution. Live, intertidal (K).

158. ***Eulithidium*** *cyclostoma* (Carpenter, 1864). Extend distribution north from Cabo San Lucas to off Puerto San Carlos, Magdalena Bay, Baja California, Mexico. Depth 2 to 10 m (S).

162. ***Eulithidium*** *substriata* (Carpenter, 1864). Extend distribution north from Puerto Libertad to off Bahía la Cholla, Sonora, Mexico, and south from Cabo San Lucas, Baja California Sur, to off Bahía Santiago, Colima, Mexico. Live, intertidal; dead to 60 m (S, K).

164. ***Eulithidium*** *variegata* (Carpenter, 1864). Extend distribution south from the Gulf of California to Punta Camerones, Mazatlán, Sinaloa, Mexico (S).

170. ***Plesiothyreus*** *osculans* (C. B. Adams, 1852). Include the Islas Perlas, Panama, in distribution. Live taken (K).

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BOOK NEWS

The Club has received a copy of the revamped 1993 edition of **Kingdom of the Seashell** by R. Tucker Abbott. The book was originally published in 1972 in hardcover. This colorful soft-covered version is the same size, has the same number of pages (256), the same plates and the information in it is as timely today as it was then. The book is divided into eleven sections treating in an easy-to-read way, kinds of shells, habitats, reproduction and lifestyle, evolution, collecting, rare shells, shells through history and uses of shells today.

The book now retails for $19.95 (it was $14.95 twenty-one years ago) and can be ordered from American Malacologists, P.O. Box 1088, Andover, MA 01810-0019. Add $2.05 for mailing.

Member Larry Buck donated the booklet **Clean Your Shells and Other Sea Life** by Betty and Robert Lipe to the Club library. This 36 page illustrated booklet discusses different methods used. to remove the animal from the shell, clean the exterior and prepare shells for the cabinet. It also has information on preparation of sand dollars, sea urchins, sea stars and sea horses. Three plates illustrate shells discussed.

Published by The Shell Store, 440 75th Ave., St. Pete Beach, Florida 33706, the publications sells for $4.95 plus shipping.

Both books will be available for circulation at the November meeting.

A SEARCH FOR CUTTLEFISH

ROLAND C. ANDERSON

Seattle Aquarium, Pier 59, Waterfront Park, Seattle, Washington 98101

I recently vacationed in Malaysia, part of which included diving on the tiny island of Sipadan, off the northeast coast of Borneo. One of my goals on this vacation was to see cuttlefish, which I had never seen in the wild.

I have always had a fondness for cuttlefish. Because they don't occur in the cold Pacific Northwest where I live and work, they are alien and exotic to me, and I like their whimsical appearance. Their crinkled eyes give them a bemused look. Their color-changing ability endows them with remarkable camouflage capability and allows them to show "emotions" on their skins. They can swim forward or backward with gentle ripplings of their fins or fast jet propulsion, truly a group of animals with interesting appearance and habits.

On a previous dive trip to Palau, I was about the only diver in our group not to spot them. I did see them at the clam-rearing facility there and we occasionally display them at the Seattle Aquarium.

Unfortunately, I didn't find any live cuttlefish underwater on the trip to Sipadan either. We saw cuttlefish in the fish market at Sandakan and found several cuttlebones on the shore. The cuttlebones looked surprisingly like pieces of white styrofoam. They were tossed up high on the beach because of their lightness. Several of them were quite large, about a foot long (Figure 1). In addition to finding them on the shore at Sipadan, I also found several smaller ones in front of our hotel at Kota Kinabalu, on the northwest side of Borneo.

These cuttlebones may have been from one of two different species, either *Sepia latimanis* or *S. pharaonis*. Although cuttlefish can be identified by the shape of their cuttlebones, we were not allowed to bring them back, since Sipadan is a marine preserve. Both occur in the area (Roper, et al, 1984) and get large. Of course the cuttlebones may have drifted there on currents, but that doesn't seem likely, as there was no growth on them. *S. pharaonis* has been reported from Sipadan (Wong, 1991), but is rarely seen.

It's going to be a few years before I can return to the tropics to resume my quest for cuttlefish. I'm not enthusiastic about undergoing the expense and durance vile necessary to get back to Borneo, so I'll probably continue my search elsewhere.

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1984. FAO species catalog, Vol 3: Cephalopods of the world. FAO Fish. Synop. 125(3):1-277.

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1991. Sipadan, Borneo's underwater paradise. Odyssey (Singapore). 216pp.

Figure 1. Issie with cuttlefish "bones" on Sipidan Island.

A SELECTED INDEX TO VOLUME XXV (1993)

THE FESTIVUS

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PROGRAM

Dead Collected
Pliocene Fossils of Southern California

Member Terry Arnold will give a slide program on the fossil shells of San Diego and Imperial Counties. He will also have a display of molluscan fossils from these areas.

Book and Reprint Sale

Shells of the month: California fossils
Meeting date: January 20th

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - November 18, 1993

The meeting was called to order by President Carole Hertz at 7:45 PM. After introduction of guests, the minutes were accepted as published in **The Festivus**.

The slate of officers for 1994, as proposed at the October meeting, was placed before the membership with nominations from the floor invited. The following officers were elected unanimously: President, Hugh Bradner; Vice President, Larry Buck; Recording Secretary, Rick Negus; Corresponding Secretary, Kay Klaus; Treasurer, Margaret Mulliner.

Hugh Bradner introduced speakers Carole and Jules Hertz who presented slides of their trip to Tonga and Western Samoa. Slides were shown of Vavau and Tongatapu, Tonga and Upolu, Western Samoa with shots of various collecting sites and some of the shells collected. The shells were also on display at the meeting.

The refreshments were provided by Carole and Jules Hertz and Wes Farmer, and Carole Hertz won the door prize.

Terry Arnold

The Club's Christmas Dinner Party

The San Diego Shell Club's annual Christmas Dinner Party on Saturday evening December 4th was a bang-up affair with fifty people in attendance, one of our largest yet. Members and guests, dressed in their holiday finery, greeted each other like long-lost relatives and enjoyed the festive atmosphere.

Following the dinner, Master of Ceremonies, Ron McPeak led the proceedings. The old board was acknowledged for its efforts, the new board introduced and outgoing president, Carole Hertz thanked the members of the board, committees and others who helped during the year.

Ron then introduced the program for the evening--mini slide presentations by members showing special places and things, and a slide review of the Club's history through its parties and special events since 1969.

The traditional gift exchange, always a highlight of the Christmas party, followed. Despite the heaters which did not work causing several attendees to be frozen, it was a grand affair and a lovely beginning to the holiday season.

Dues are Due

Dues for 1994 are now due and payable to the San Diego Shell Club. Please send to the Club address shown on the masthead. All domestic memberships are $12; overseas (surface mail) $15; overseas (air mail) $30. Dues must be received by the end of January for inclusion on the 1994 roster.

The Club Receives Generous Book Donations

The San Diego Shell Club library is the recipient of three generous gifts.

Helen DuShane has donated more than ten books plus various soft-covered publications with permission to sell those not useful for the library. Any material sold will be used for special projects of **The Festivus** and/or library purchases. One rare book will be sold at the Club auction. See page 16. A listing of her books retained in the library will be published later.

John Jackson has given a copy of the new 571 page Lorenz & Hubert's, **A Guide to Worldwide Cowries** as well as the two volume set of the new Barry Wilson work, **Australian Marine Shells**. Both these works will be reviewed in future issues of **The Festivus**.

Thirdly, the Club has received from The Smithsonian Institution Libraries the two volume **Handbook of Systematic Malacology**, a translation of the monumental work of Johannes Thiele by the editors Rüdiger Bieler and Paula M. Mikkelsen.

The Club is very grateful for the generosity of the donors.

DR. FRED BAKER, SAN DIEGO CONCHOLOGIST: A MOST REMARKABLE MAN

CAROLE M. HERTZ

Santa Barbara Museum of Natural History
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"The most scholarly early conchologist who has ever honored San Diego by making this city his residence is Dr. Fred Baker [Figure 1]. At times he filled the positions of president of the Society of Natural History and of director of the museum. At one time his was the largest privately owned collection of shells in the world.... In 1931 the San Diego Shell Club [an earlier incarnation] was formed. Dr. Baker was, of course, the most outstanding member...." (Dr. Joshua L. Baily, from a talk for the first annual banquet of the San Diego Shell Club, January 1962).

Frederick Baker was born in Ohio on January 29, 1854, did his undergraduate and masters studies at Cornell University, and in 1880 he and his future wife, Charlotte LeBreton Johnson, graduated from the University of Michigan with degrees in medicine (Baily, 1938). After their marriage in 1881, both practiced briefly in Ohio and then moved to New Mexico because of Charlotte's malaria (Hippen, 1983:46). They practiced medicine there, and were also in the cattle business (San Diego Sun, May 17, 1938).

Figure 1. Dr. Fred Baker. 1914, Tokyo, Japan. Scripps Institution of Oceanography archives.

It is said that Fred Baker "broke a long distance record" in his medical practice in New Mexico (then a territory) when he "drove and rode 1,000 miles to treat two gunshot victims." (San Diego Union, Mar. 31, 1932). While in New Mexico, their two children, Robert and Mary (called Mollie), were born, Robert in a log cabin in Pie Town. In 1885 they were all almost killed while "...in a real prairie schooner with our

two babies swung to the wagon bows in a clothes basket to get away from the last Apache Indian raid..." (SDNHM archives: Feb. 1938 letter by Baker to J. R. Le B. Tomlin). They settled in San Diego in 1888 (San Diego Sun, May 17, 1938), where they both practiced medicine as Dr. Charlotte and Dr. Fred and had active careers in the community throughout their lives (Baily, 1938) (Figures 2, 3).

Charlotte, who boasted that she was a physician first and a female second (Hippen, 1983:47), worked to promote pasteurization laws, wrote on the germ theory of disease, was the San Diego County Medical Society's first woman president and was honorary president of the YWCA, founder and honorary president of the WCTU (San Diego Sun, Nov. 1, 1937) and president of the Equal Suffrage Association (San Diego Union, Aug. 20, 1961).

Fred Baker, a specialist in eye, ear, nose and throat disorders (San Diego Union, May 17, 1938), and ardent prohibitionist (Baily, 1938), was active in civic affairs serving twice as president of the County Medical Society, on the San Diego City Council, County Board of Education and on the Board of Trustees of San Diego State Normal School [now San Diego State University] (Hippen, 1983). But his greatest interest was natural history, especially conchology, and his accomplishments in this area made for his greatest contributions.

Figure 2. Drs. Fred and Charlotte Baker and children Bob and Molly, circa 1905. San Diego Historical Society archives.

The founding of Scripps Institution of Oceanography in La Jolla, then called the San Diego Marine Biological Association, was largely the result of Fred Baker's untiring effort. It was one of his chief loves, and he was president during every year of its existence but one (Hippen, 1970). The location of the institute was originally planned for "some point in southern California south of Santa Barbara, probably San Pedro..." but promised funding for the "large conceptions" fell through and it was realized that the area would become an urban center and probably not be suitable in the future. Baker invited the marine biologists to look at San Diego (Ritter, 1912). He also invited E. W. Scripps, "one of his poker cronies at the Cuyamaca Club...to see what two University of California marine biologists were up to" (Trimble, 1992). Scripps formed a strong personal friendship with one of the two biologists, Dr. William Emerson Ritter, who became the Institution's first scientific director, and Scripps became a staunch supporter of the new institution. At first Coronado was chosen as a site in 1903. "With the enthusiastic and efficient assistance of Dr. Baker, who from his profession and his interest in conchology was something of a biologist, the removal of the equipment from San Pedro to San Diego was made," and a lab was set up in the boathouse of the Coronado Hotel (Ritter, 1912). But docking for the research vessels took longer

Figure 3. Baker home in Point Loma - Roseville, 1898 Rosecrans Blvd., circa 1905. San Diego Historical Society archives.

there than in San Diego, and it was also discovered that the marine life differed from that of the open ocean which was their interest (Ritter, 1912). Fred Baker then suggested La Jolla. It was "here the station was first housed within walls of its own construction and possession" in 1905 (Ritter, 1912). Baker was a respected friend of those who could support the marine laboratory scientifically and financially (Shaw, 1976). He raised the funds for the first laboratory in La Jolla, and permission for use of the waterfront land was gained from the San Diego City Council. Mr. E. W. Scripps and Miss E. B. Scripps gave considerable material support and "soon became the exclusive patrons so far as money gifts were concerned" (Ritter, 1912) and later arranged for the tract of land that became the Scripps Institution as we know it today. Baker was the organizer and devoted much time and attention to all the details involved with establishing the laboratory (Shaw, 1976). In 1911, he deeded the property of the Marine Biological Association to the University of California, where it has become a renowned research laboratory (Hippen, 1970).

Baker described his feelings about this effort in a letter to Tomlin in 1938 when he wrote, "I say that I was simply the lucky accident, but I am counted as one of the founders, this being the only really important public service that I have ever rendered."

Baker, with F. W. Kelsey, also of San Diego, "collaborated...in establishing the Baker-Kelsey collection of Pacific Coast [M]ollusca, now at the Scripps Institution at La Jolla (Figure 4) of which Dr. Fred was honorary curator at the time of his death" (Baily, 1938). Baker wrote that the collection contained "about 3,000 species and subspecies" (1938 letter to Tomlin). In 1951, Wesley R. Coe of that institution, volunteered to "put the Baker shell collection in better shape" to make it available for "comparative examinations" (SIO archives, folder G9). In July of that year, in another memorandum from Carl Hubbs, he requested that Sam Hinton make the Baker-Kelsey collection ready to show to "any of the malacologists who might ask to see it..." (SIO archives, folder G9). The collection was stored for a time behind the aquarium and some material was pilfered. Later it was in the invertebrate collection

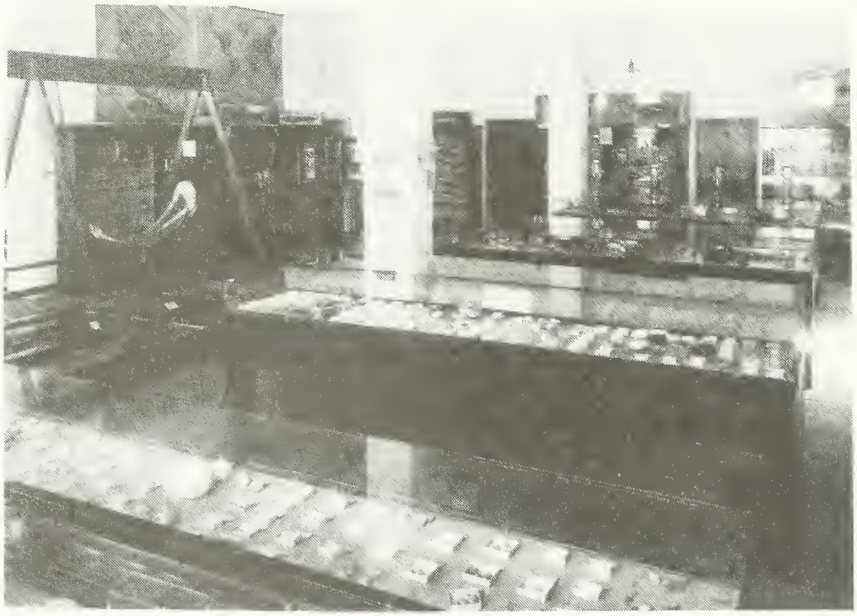

Figure 4. The Baker-Kelsey collection at the museum at Scripps Institution of Oceanography, October 1933. Scripps Institution of Oceanography archives.

separated in its original cabinets (Neuman, pers. comm., Feb. 1993). Since that communication the Baker-Kelsey collection has been accessioned in the molluscan dry collection and is on computer with the information again available for researchers (Luke, pers. comm., July, 1993). Over 200 lots from Baker's collection of west coast, Mexican and western Pacific mollusks form part of this collection. Only a specimen of *Rissoina bakeri* Bartsch from Isla San Martín (M4519, labelled cotype) is segregated as type material.

Fred Baker was also "one of that small group of five men [all physicians] who early in 1916, met in the office of Dr. Harry M. Wegeforth and founded the Zoological Society of San Diego. Thus he became one of the charter members..." (Zoonooz, Oct. 1937).

He was also a staunch supporter of the San Diego Society of Natural History and was honorary curator at the time of his death (San Diego Union, May 17, 1938). He served in many official capacities in the early years of the Society: Acting Director (1900), President (1921), Vice President (1925) as well as serving on the Board of Directors for many years (San Diego Union, Jan. 10, 1921; Jan. 12, 1930; Jan. 15, 1933). He gave many talks to the Society on his experiences while traveling and collecting shells (San Diego Union, July 24, 1921; Aug. 6, 1921; Feb. 3, 1922). He "...made and later gave to the Society significant collections of mollusks...traveled under considerable inconvenience to collect and study shells in places like Brazil, Japan, Panama and even the Gulf of California (Environment Southwest, 1974). Baker's molluscan collection was presented to the museum in 1938 after his death (San Diego Union, May 17, 1938). From his molluscan material, holotypes of eleven species he described with V. D. Philip Spicer of San Diego, an apothecary in the Navy, were placed in the type collection of the San Diego Natural History Museum, as well as paratypes of three terrestrial species Baker described from Brazil. Eleven paratypes of molluscan species described by Baker with G D. Hanna and A. M. Strong are also in the type collection of this same institution.

Fred Baker seemed to have had his love of natural history and travel from the time of his youth. During his undergraduate education at Cornell University, he "lived in the same house with Dr. Wesley Newcomb, a former practicing physician in Honolulu, who had just sold his great collection of shells to the University for fourteen thousand dollars" (Baker, 1928) and was well known for his work on the tree snails Achatinellidae of the Hawaiian Islands, naming nearly 100 species (Clarke, 1960). Baker's undergraduate education at Cornell was interrupted by a six-month trip in Europe with Albert N. Prentiss, a professor of botany, and a trip in Mexico and Central America during his senior year with the Russian meteorologist, Dr. Woiekoff, which extended to four years during which he learned to speak Spanish and gained an interest in anthropology (Ritter, 1938; Baily, 1938). Dr. Newcomb, he said, "urged me strongly to collect shells" during that trip in which he traveled from "Yucatan along the coast of the Gulf of Mexico to Mexico City, then to the city

of Guatemala and back into Mexico where I went through the revolution which first made Porfirio Diaz President of Mexico, then back into Guatemala for a year and a half. During this time I was in the wilds three fourths of the time, but I do not recall seeing a single shell except on my occasional visits to sea beaches ..." (Baker, 1928).

While maintaining a busy schedule as a physician and in his many civic duties, Baker continued to travel and collect and study the Mollusca (San Diego Union, May 17, 1938). In 1902, his first article on conchology, listing shells collected on Isla San Martín in the Gulf of California, was published in The Nautilus (Baker, 1902).

In 1911, he joined the Stanford expedition to Brazil as surgeon and malacologist. He said of that, "It pays to advertise. Learning in the winter of 1910-11 that my former Cornell classmate, Dr. [J. C.] Branner, planned to take a scientific expeditio[n] to Brazil in the summer of 1911, I wrote my friend, Prof. Straks, asking if they did not need a roustabout, an interpreter, a conchologist, and a physician all for one price of admission. I expected to pay my own way but found that the matter of having a physician along seemed of enough importance as to induce them to put me on the same terms as the other members of the party after Dr. McFarland found it impossible for him to go." (Baker, 1938). Following the expedition he continued to travel 1000 miles up the Amazon River collecting land and freshwater shells. This resulted in his important paper, "Land and Fresh Water Mollusks of the Stanford Expedition to Brazil," in which he described 21 new terrestrial species and 17 freshwater species. Baker worked with J. R. Le B. Tomlin on the marine species collected on that expedition but the report was never finished (Baily, 1938). Baily (1962) said of that project "and now can never be, as the type material has disappeared."

In 1914, while he and his wife were on a two year trip around the world, he traveled to the Orient and collected for the National Museum of Natural History (Smithsonian), the Academy of Natural Sciences (Philadelphia) and the California Academy of Sciences. "I had arrange[d] with another classmate, Dick Rathbun, who was assistant Secretary of the Smithsonian Institution in charge of the [N]ational Museum, to do such collecting for the Museum as I could without interfering with my plans to collect shells for myself and our real purpose as tourists." While in Cambodia on a sampan, he noticed that the crew members would anchor at mealtimes and jump overboard for "shell fish." "After they had eaten the animals, I would clean up the shells and this trip yielded me about half a bushel of the finest things I took in the Orient." He added, "We had gathered shells at every point possible in our wanderings during nearly two years and I found that my records showed fifty boxes ranging from large packing cases to mailing lots sent home for study. Much of the material is in duplicate and the great collections are made by exchanging with other conchologists, all over the world. I have spent so much time in studying those of my own collecting that I have had little time for exchanging but I have added some thousands of species to my collection since coming home. I am careful to keep the location labels carefully and anyone can name the new things any time in the next fifty years, so that, when I am through playing with them, I expect that they will go into our local Museum and that at some future time others will have finished the work for which the shortening years will leave me all too little time" (Baker, 1928).

In 1921, Baker, representing the Department of Paleontology, was the conchologist on an expedition by the California Academy of Sciences to the Gulf of California. The aim of this expedition was a comprehensive study of the flora and fauna of the islands in the Gulf of California and the adjacent mainland (Slevin, 1923; Hanna, 1923, 1949). It was Baker's responsibility on this trip to make the collections of both fossil and living mollusks, terrestrial and marine, keep the field notes (Hanna & Hertlein, 1927), and identify much of the material (Baker & Hanna, 1927). Baker (1928) said of this trip, "We had a glorious three months cruise in the Gulf, touching at many places in lower California and Sonora and landing on twenty-six islands, more than had ever been visited by any scientific expedition before. We have only reported on three families of the shells taken but have already described about forty species and varieties new to science." After the trip, Hanna (1963) and Baker began identification of the species. "As the work progressed and more material accumulated, many difficulties were encountered. Failing health necessitated that Dr. Baker withdraw at an early stage but his keen judgment of obscure points and

enthusiasm continued to be an inspiration until just prior to his death."

Baker's field notes not only identified collecting areas but were a running log of the expedition. He collected a Pliocene *Pecten* 15 miles north of Loreto which was named for him (Hanna & Hertlein, 1927). Some collecting was done by dredging, with many problems reported in getting the dredge to "dig in," but which resulted in many minute mollusks including pyramidellids (Baker, Hanna & Strong, 1928), rissoids (Baker, Hanna & Strong, 1930a) and epitoniids (Baker, Hanna & Strong, 1930b). Additional papers published from this expedition, and subsequent ones in 1922 and 1925, treated the Cerithiopsidae, Cerithiidae and Cyclostrematidae (Baker, Hanna & Strong, 1938a) and Columbellidae (Baker, Hanna & Strong, 1938b).

Baker retired at age 69, fifteen years before his death and continued his work with shells, some of his major papers being published after his retirement (Figure 5). During these later years, he continued generously sharing his knowledge and his duplicate shells with young and old, lending his books, and giving access to his "monumental card catalog" (Baily, 1938). Of this card catalog, Baily (in Keep & Baily, 1935: viii) wrote that Baker's "monumental card catalogue of Pacific Coast Mollusca has been of inestimable assistance in untying many of the Gordian knots afforded by modern synonymy ...." One formerly active member of the San Diego Shell Club and a San Diego native, Philip Faulconer, told me that he remembers with great pleasure when as a young boy of eleven, he would visit with Baker, who was then nearing 80. Dr. Fred would show

Figure 5. A meeting at the Baker home, circa 1928. Back row, l-r: Mr. E. E. Hand, Mrs. Hand, Mr. Herbert N. Lowe, Dr. Fred Baker. Front row, l-r: Miss Julia Ellen Rogers, Mrs. Ida S. Oldroyd, Mr. Tom S. Oldroyd, Mr. W. P. Cooke. Seated: Mr. V. D. Philip Spicer. San Diego Shell Club archives.

him his shell collection and Phil said, "He gave me a cigar box full of dredgings from Yokohama and a Coddington Glass [Bausch & Lomb magnifier] and taught me to look for the little shells." Phil added, "His other gift to me was an *Oliva porphyria*, the finest I've ever seen and a shell which I still have and treasure."

Seven months after the death of his wife of 55 years, Baker died at age 84 after major surgery "from which he was unable to rally." (San Diego Sun, May 17, 1938). He was survived by a daughter, Miss Mary C. Baker, dean of women, Fresno State College; a son, Captain Robert H. Baker of San Diego; and a grandson, Kenneth Baker (Baily, 1938). Some years before his death, in discussing taxonomy before the local chapter of the Phi Beta Kappa Society, Baker (1928) jested about immortality in speaking about renaming the preoccupied crustacean genus *Melanella* Wade, 1919, to *Vogdesella* in honor of General Vogdes. He said, "My name will be associated with this name and that of the various shells I have described, but my bid for fame is of little use, for no one with common names as Smith, Jones, or Baker can hope to make a stir with so little as I have done...."

Fred Baker was too modest. Although two other Bakers, contemporaries of his -- H. B. Baker and F. C. Baker -- were prominent malacologists, Fred Baker's contributions to the science were considerable.

Species Named in Honor of Dr. Fred Baker

Rissoina bakeri Bartsch, 1902
Alvania bakeri Bartsch, 1910
Bernardina bakeri Dall, 1910
Turbonilla (Strioturbonilla) bakeri Bartsch, 1912
Gundlachia bakeri Pilsbry, 1914
Erycina bakeri Dall, 1916
Cerithiopsis (Cerithiopsis) bakeri Bartsch, 1917
Epitonium (Nitidiscala) bakhanstranum Keen, 1962 [named for Baker, Hanna & Strong]
Sabinella bakeri Bartsch, 1917
Philine bakeri Dall, 1919
Fartulum bakeri Bartsch, 1920
Aglaja bakeri MacFarland, 1924,=*Navanax inermis* (Cooper, 1863), *fide* Keen, 1971
Pecten (Patinopecten) bakeri Hanna & Hertlein, 1927
Aesopus fredbakeri Pilsbry & Lowe, 1932
Mangelia fredbakeri Pilsbry, 1932,=*Nassarina tincta* (Carpenter, 1864), *fide* Abbott, 1974; Keen, 1971.
Fusinus fredbakeri Lowe, 1935
Botulina bakeri Dall, Bartsch & Rehder, 1938
Rissoella (?) bakeri Strong, 1938
Circulus bakeri (Strong & Hertlein, 1939)
Aspella bakeri Hertlein & Strong, 1951

Following is a listing of the molluscan taxa described by Baker and Baker with others. The taxa are listed in alphabetical order by species name, followed by genus, author, date, page and figure reference. The repositories of the primary type material for each species follow with the respective museum numbers as far as is known. Remarks, where necessary, are inserted in square brackets. Unless otherwise noted, species are preserved dry in these collections.

For Baker type material in the SDNHM, the numbers in parentheses following the museum numbers refer to Baker's private collection numbers, which were the ones published. For the CAS, the numbers in parentheses refer to former numbers before being placed in the invertebrate zoology (IZ) type collection: GeTy for Geology type collection numbers and SUTy for Stanford University type collection numbers.

In the case of the type material of the genus *Doryssa*, all those in Baker (1914) have been attributed to Pilsbry by Clench & Turner (1962) and J. T. Smith (1978). H. B. Baker (1964) however, attributed some of the *Doryssa* taxa to Baker (1914). In correspondence with Elizabeth Kools of the California Academy of Sciences I learned of Michael Kellogg's CAS database entry stating, "... authorship of this taxon [*D. heathi* and *D. starksi*], belongs to F. Baker as indicated by the original label and the typography and style of the text." Kools then wrote that she had "looked at the publication [Baker, 1914] and the original labels for these specimens ..." and found that Kellogg's conclusion "is consistent with original labels of taxa we have in our collection which were described on these pages. On the bottom of page 651, the quotes stop as do new taxa attributed to Pilsbry. The style also changes which Michael noted..." After study, following Kool's letter, I have included the *Doryssa* species in question in the listing of F. Baker taxa. Those in quotation marks in Baker (1914) remain as taxa described by Pilsbry.

The following abbreviations are used:

ANSP Academy of Natural Sciences of Philadelphia
CAS California Academy of Sciences
CASIZ California Academy of Sciences, Invertebrate Zoology
fig(s.) figure(s)
GeTy Geology Type
SDNHM San Diego Natural History Museum
SIO Scripps Institution of Oceanography
SUTy Stanford University Type
USNM National Museum of Natural History, Smithsonian Institution
H holotype
P paratype
L lectotype
PL paralectotype
pl(s.) plate(s)
spec. specimen(s)

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Deborah Day and Carolyn Rainey of the Archives of the library of Scripps Institution of Oceanography were most helpful in locating and suggesting archival material that might be useful to me and arranged for prints of photographs in their collection. The San Diego Historical Society made a print of the photograph in Figure 2 and also

made material on Fred Baker available to me, as did the San Diego Shell Club archives and librarian Carol Barsi, now retired, and Billee Meeder both of the SDNHM library. William Newman and Spencer Luke of SIO and Betty Shor of San Diego were helpful in my learning the whereabouts and condition of the Baker-Kelsey collection; Spencer Luke provided a listing of the Fred Baker material housed there.

Gary Rosenberg and David G. Robinson of the ANSP, James H. McLean and Lindsey Groves of the LACM, Terrence Gosliner and Elizabeth Kools of the CAS, and Alan Kabat of the USNM were most gracious in giving of their time in providing information on the type material in their respective collections and the Department of Marine Invertebrates, SDNHM made access to the collection and facilities available. Paul Scott of the Santa Barbara Museum of Natural History, Regina K. Kawamoto of the Bishop Museum, Honolulu, and Teresa Cristina S. de Avila Peres and Cristina Sposito of the Goeldi Museum, Pará, Brasil, have offered to search their museums' respective molluscan collections for Baker type material. Philip Faulconer of San Diego shared his memories of Baker with me and provided a picture of Baker's home. Eugene Coan and George Kennedy gave helpful information and Eugene Coan reviewed the paper. To all of these people I am very grateful.

Species Described by Baker and Baker With Others

abbotti, Triphora -- Baker & Spicer, 1935:39, pl. 5, fig. 4. H=SDNHM 1557 (23763); P=USNM 469116 (1 spec.).

abunaensis, Streptaxis -- Baker, 1914:629, pl. 22, figs. 8-10. H=ANSP 109313.

amortajadensis, Turbonilla (Chemnitzia) -- Baker, Hanna & Strong, 1928:209, pl. 11, fig. 2. H=CASIZ 066069 (ex GeTy 4001).

angelensis, Haminoea -- Baker & Hanna, 1927:129-130, pl. 4, fig. 1. H=CASIZ 032113 (ex GeTy 4001).

angustior, Acteocina -- Baker & Hanna, 1927:124-125, pl. 4, fig. 5. H=CASIZ 032116 (ex GeTy 2513).

audax, Odostomia (Chrysallida) -- Baker, Hanna & Strong, 1928:230-231, pl. 12, fig. 7. H=CASIZ 066088 (ex GeTy 4038); P=CASIZ 066089 (ex GeTy 4039); P=SDNHM 1839 (4039).

azteca, Turbonilla (Pyrgiscus) -- Baker, Hanna & Strong, 1928.:222-223, pl. 11, fig. 14. H=CASIZ 066079 (ex GeTy 4017); P=CASIZ 066080 (ex GeTy 4018-4020); P=SDNHM 1838.

bartschi, Anodontites -- Baker, 1914:668, pl. 27, figs. 3-4. H=ANSP 109370; P=SDNHM 1822a,b.

basilirata, Rissoina gisna -- Baker, Hanna & Strong, 1930:32, pl. 1, fig. 12. H=CASIZ 066055 (ex GeTy 4606).

berryi, Rissoina -- Baker, Hanna & Strong, 1930:35-36, pl. 1, fig. 3. H=CASIZ 066057 (ex 4608).

brannicri, Drymaeus -- Baker, 1914:637-638, pl. 23, figs. 1-4. H=ANSP 109308; P=CASIZ 064149 (ex SUTy 6188) 1 spec. + 1 fragment [the fragment is the body whorl only (Kools, pers. comm)].

brasiliana, Strobilops -- Baker, 1914:647, pl. 21, figs. 8-9. H=ANSP 109310; P=ANSP 397242 (6 spec.); P=CASIZ 066422 (ex GeTy 1821).

bristolae, Ceritliopsis (Ceritliopsida) -- Baker, Hanna & Strong, 1938:219-220, pl. 19, fig. 4. H=CASIZ 065939 (ex GeTy 5457).

bristolae, Liotia acuticostata -- Baker, 1929:72, new name for *Liotia acuticostata radiata* Dall, 1918, not *radiata* Kiener.

cachoeirae, Doryssa -- Baker, 1914:655-656, pl. 25, fig. 9. H=ANSP 109356.

cassi, Ceritliopsis (Cerithiopsida) -- Baker, Hanna & Strong, 1938:220-221, pl. 19, fig. 5. H=CASIZ 065941 (ex GeTy 5458).

ccarana Psadara derbyi -- Baker, 1914:634, pl. 22, fig. 19. H=ANSP 109344.

chalcana, Turbonilla (Strioturbonilla) -- Baker, Hanna & Strong, 1928:212, pl. 11, fig. 6. H=CASIZ 066071 (ex GeTy 4005); P=SDNHM 1835-1837.

chamberlini, Triphora -- Baker, 1926:235, pl. 24, fig. 2. H=CASIZ 066365 (ex GeTy 2150).

charlottei, Leptinaria -- Baker, 1922:36(1):32, new name for *L. imperforata* Baker, 1914, not Strebel, 1882.

chimera, Atys -- Baker & Hanna, 1927:126, pl. 4, fig. 4. H=CASIZ 032115, (ex GeTy 2514).

contrerasi, Odostomia (Chrysallida) -- Baker, Hanna & Strong, 1928:231-232, pl. 12, fig. 13. H=CASIZ 066090 ex GeTy 4040).

contrerasi, Triphora -- Baker, 1926:230, pl. 24, fig. 7. H=CASIZ 066357 (ex GeTy 2141); P= CASIZ 066358 (ex GeTy 2142).

cookeana, Streptaxis -- Baker, 1914:628-629, pl. 22, figs. 5-7. H=ANSP 109304; P=ANSP 397243 (4 spec.); P=CASIZ 066416 (ex GeTy 1136-1137); P=LACM 2234 (2 spec.).

cookeana, Triphora -- Baker & Spicer, 1935:41, pl. 5 fig. 7. H=SDNHM 1560 (23766).

coronadoensis, Strigatella (Atrimitra) -- Baker & Spicer, 1930:176, pl. 19, fig. 1. H=SDNHM 667 (18295).

coyotensis, Turbonilla (Mormula) -- Baker, Hanna & Strong, 1928:223-224, pl. 11, fig. 17. H=CASIZ 066081 (ex GeTy 4023); P=CASIZ 066082-066083 (ex GeTy 4024-4025).

cylindricus, Odontostomus (Cyclodontina) scabrellus -- Baker, 1914:65:642, pl. 23, figs. 15-16. H=ANSP 109327.

dalli, Anodontites -- Baker, 1914:667, pl. 27, figs. 1-2. H=ANSP 109369.

defuncta, Cylichnella -- Baker & Hanna, 1927:127-128, pl. 4, fig. 3. H=CASIZ 032118 (ex GeTy 2515).

dorina, Mitrella -- Baker, Hanna & Strong, 1938b:248-249, pl. 24, fig. 6. H=CASIZ 065953 (ex GeTy 5817).

eatoni, Systrophia -- Baker, 1914:631, pl. 22, figs. 14-15. H=ANSP 109299; P=CASIZ 066418 (ex GeTy 1105).

elongatus, Hemisinus flammeus -- Baker, 1914:618-672, pl. 25, figs. 16. H=ANSP 109367.

escondidensis, Triphora -- Baker 1926:236-237, pl. 24, fig. 11. H=CASIZ 066366 (ex GeTy 2151).

espiritum, Epitonium (Nodiscala) -- Baker, Hanna & Strong, 1930b:46, pl. 2, fig. 4. H=CASIZ 066061 (ex GeTy 4778); P=CASIZ 066062 (ex GeTy 4779-4780).

evermanni, Triphora -- Baker, 1926:227-228, pl. 24, fig. 9. H=CASIZ 066353 (ex GeTy 2137); P=CASIZ 066354 (ex GeTy 2138).

evermanni, Turbonilla (Cingulina) -- Baker, Hanna & Strong, 1928:226-227, pl. 12, figs. 3-4. H=CASIZ 024961 (ex GeTy 4030).

fantasma, Cyliehnella -- Baker & Hanna, 1927:128-129, pl. 4, fig. 6. H=CASIZ 032117 (ex GeTy 2516).

flammeus, Hemisinus -- Baker, 1914:657, pl. 25, fig. 15. H=ANSP 109366; P=SDNHM 1817-1819.

franciscana, Turbonilla (Pyrgolampros) -- Baker, Hanna & Strong, 1928:216, pl. 11, fig. 9. H=CASIZ 066075 (ex GeTy 4012).

gabrielensis, Odostomia (Salassia) -- Baker, Hanna & Strong, 1928:227-228, pl. 12, fig. 6. H=CASIZ 066084 (ex 4032); P=CASIZ 066085 (ex GeTy 4033).

gallegosi, Alvania -- Baker, Hanna & Strong, 1930a:26-27, pl. 1, fig. 11. H=CASIZ 066051 (ex GeTy 4599).

globosa, Doryssa -- Baker, 1914:651-652, pl. 25, figs. 1-2. H=ANSP 109352.

golischi, Epitonium (Nodiscala) -- Baker, Hanna & Strong, 1930b:44-45, pl. 2, figs. 1-2. H=CASIZ 066059 (ex GeTy 4770); P=CASIZ 066060 (ex GeTy 4771).

gonzagensis, Retusa -- Baker & Hanna, 1927:131-132, pl. 4, fig. 8. H=CASIZ 066191 (ex GeTy 2519).

gonzagensis, Turbonilla (Pyrgolampros) -- Baker, Hanna & Strong, 1928:213-214, pl. 11, fig. 7. H=CASIZ 066072 (ex GeTy 4006); P=CASIZ 066073 (ex GeTy 4007-4010).

granti, Delphinoidea -- Baker, Hanna & Strong, 1938a:236-237, pl. 22, figs. 4-6. H=CASIZ 065947 (ex GeTy 5468).

granti, Triphora -- Baker & Spicer, 1935:40, pl. 5, fig. 5. H=SDNHM 1558 (23764).

grijalvae, Odostomia (Menestho) -- Baker, Hanna & Strong, 1928:238-239, pl. 12, fig. 16. H=CASIZ 066096-066097 (ex GeTy 4055-4056).

guajarana, Helicina -- Baker, 1914:626, pl. 21, fig. 3. H=ANSP 109340.

hannai, Dentalium -- Baker, 1925:84-85, pl. 10, figs. 4-5. H=CASIZ 066343 (ex GeTy 1757); P=CASIZ 060763 (ex SUTy 5445); P=SDNHM 1788-1789, 1811.

hannai, Triphora -- Baker, 1926:225-226, pl. 24, fig. 1. H=CASIZ 066351 (ex GeTy 2135); P=CASIZ 066352 (ex GeTy 2136).

harrisi, Gibbula -- Baker & Spicer, 1930:177-178, pl. 19, figs. 3-4. H=SDNHM 666 (18297); P=SDNHM 3304-3318; P=LACM 1014 (2 spec.), P=USNM 424553 (3 spec.), P=ANSP 162012 (9 spec.), P=ANSP 166001 (4 spec.), P=ANSP 160240 (3 spec.), P=ANSP 161204 (2 spec.).

harrisi, Triphora -- Baker & Spicer, 1935:37-38, pl. 5, figs. 1-2. H=SDNHM 1555 (23761); P=USNM 469114 (1 spec.).

heathi, Doryssa -- Baker, 1914:653-654, pl. 25, figs. 3,4,7. H=ANSP 109935; PL=SDNHM 1812-1813 [see Wilson & Kennedy, 1967].

herrerae, Alvania -- Baker, Hanna & Strong, 1930a:25-26, pl. 1, fig. 2. H=CASIZ 066050 (ex GeTy 4598).

herrerae, Odostomia (Pyrgulina) -- Baker, Hanna & Strong, 1928:233-234, pl. 12, fig. 9. H=CASIZ 066091 (ex GeTy 4041).

hiranoi, Ostrea -- Baker & Spicer, 1930:175, pl. 18, figs. 1-3. H=SDNHM 664a,b (18294); P=SDNHM 1077, 1078a,b, 1079-1085, 1086a,b, 1087, 1088a,b-1091 a,b, 1092-1095, 1096a,b, 1097-1126; P=CASIZ 066042 (ex GeTy 7192).

iheringi, Doryssa -- Baker, 1914:654-655, pl. 25, fig. 8. H=ANSP 109354; P=SDNHM 1814.

imperforata, Leptinaria -- Baker, 1914:646, pl. 21, fig. 19. [preoccupied by Strebel, 1882. See *L. charlottei* Baker, 1922].

jamaeliimensis, Hyria -- Baker, 1914:644-645, pl. 27, figs. 8-9. H=ANSP 109373.

jekylli, Entodina -- Baker, 1914:630-631, pl. 22, figs. 11-13. H=ANSP 109311; P=CASIZ 064579 (ex SUTy 8255), P=CASIZ 066417 (ex GeTy 1117).

johnsoni, Turbonilla (Pyrgiscus) -- Baker, Hanna & Strong, 1928:218-219, pl. 11, fig. 11. H=CASIZ 066077 (ex GeTy 4014).

johnstoni, Rissoella -- Baker, Hanna & Strong, 1930a:36-37, pl. 1, fig. 16. H=CASIZ 066058 (ex GeTy 4612).

johnstoni, Triphora -- Baker, 1926:233-234, pl. 24, figs. 3-4. H=CASIZ 066361 (ex GeTy 2145); P=CASIZ 066362-066364 (ex GeTy 2146-2148a).

kelseyi, Diplodon -- Baker, 1914:665-666, pl. 27, figs. 5-7. H=ANSP 109371; P=CASIZ 060865 (ex SUTy 5819); P=CASIZ 066426 (ex GeTy 5640).

kelseyi, Epitonium (Asperiscala) -- Baker, Hanna & Strong, 1930b:48-49, pl. 2, fig. 7. H=CASIZ 066063 (ex GeTy 4766).

kinoi, Cerithiopsis (Cerithiopsida) -- Baker, Hanna & Strong, 1938a:221-222, pl. 18, fig. 6. H=CASIZ 065942 (ex GeTy 5451).

laterculus, Helicina -- Baker, 1914:626-627, pl. 21, figs. 4-5. L=ANSP 109339; PL= ANSP 358656 (3 spec).

lowei, Cyclostrema -- Baker, Hanna & Strong, 1938a:233-234, pl. 20, figs. 1-3. H=CASIZ 065943 (ex GeTy 5461); P=SDNHM 1920.

lucasana, Alvania -- Baker, Hanna & Strong, 1930a:24-25, pl. 1, fig. 1. H=CASIZ 066049 (ex GeTy 4597).

lucasana, Delphinoidea -- Baker, Hanna & Strong, 1938a:237-238, pl. 19, figs. 10-12. H=CASIZ 065948 (ex GeTy 5460).

lyrta, Amphissa -- Baker, Hanna & Strong, 1938b:252-253, pl. 15, fig. 1. H=CASIZ 065905 (ex GeTy 5816).

madreensis, Cireulus -- Baker, Hanna & Strong, 1938a:236, pl. 23, figs. 1-3. H=CASIZ 065946 (ex GeTy 5469); P=SDNHM 1925-1929.

mamoreensis, Leptinaria -- Baker, 1926. New name for *L. perforata* Baker, 1914, not Pfeiffer. H=ANSP 109331.

manni, Litoridina -- Baker, 1914:658, pl. 26, fig. 15. H=ANSP 130701; PL=SDNHM 1821 [see Wilson & Kennedy, 1967].

maranguapensis, Odontostomus (Cyclodontina) inflatus -- Baker, 1914:641-642, pl. 23, fig. 18. H=ANSP 109323.

mariae, Cyclostrema -- Baker, Hanna & Strong, 1938a:234, pl. 21, figs. 7-9. H=CASIZ 065944 (ex GeTy 5465).

mayana, Turbonilla (Pyrgiscus) -- Baker, Hanna & Strong, 1928:219-220, pl. 11, fig. 12. H=CASIZ 066078 (ex GeTy 4015).

mayi, Guppya -- Baker, 1914:632, pl. 21, figs. 6-7. H=ANSP 109338.

melanelloides, Rissoina -- Baker, Hanna & Strong, 1930:31-32, pl. 1, fig. 5. H=CASIZ 066054 (ex GeTy 4062); P=SDNHM 1915.

mendozae, Odostomia (Ividella) -- Baker, Hanna & Strong,

1928:234-235, pl. 12, fig. 11. Holotype missing. ["A vial with specimen label and typed [Myra Keen] label reads 'Holotype 4042 - missing - as checked 5/31/48 M.K.'" (pers. comm. Kools)]; P=CASIZ 066093 (ex GeTy 4043-4045); P=SDNHM 1840-1842.

monserratensis, Alvania -- Baker, Hanna & Strong, 1930a:27-28, pl. 1, fig. 9. H=CASIZ 066052 (ex GeTy 4600).

naliuana, Turbonilla (Strioturbonilla) -- Baker, Hanna & Strong, 1928:211-212, pl. 11, fig. 5. H=CASIZ 066070 (ex GeTy 4004); P=SDNHM 1834.

navarettei, Odostomia (Menestho) -- Baker, Hanna & Strong, 1928:239, pl. 12, fig. 17. H=CASIZ 066098 (ex GeTy 4057).

obsolescens, Diplodon -- Baker, 1914:666-667, pl. 22, figs. 16-17. L=ANSP 109372 ["109327 is a misprint in Johnson & Baker" (Rosenberg, pers. comm.). Lectotype designated by Johnson & Baker, 1973].

ofuensis, Triphora -- Baker & Spicer, 1935:38, pl. 5, fig. 3. H=SDNHM 1556 (23762); P=USNM 469115 (1 spec.). [One other paratype - "Spec. lost, noticed 9/5/80, vial broken HAR" (*i.e.* Harald A. Rehder), (pers. comm. A. Kabat)].

oweni, Triphora -- Baker, 1926:232-233, pl. 24, fig.10. H=CASIZ 066360 (ex GeTy 2144).

paparyensis, Segmentina -- Baker, 1914:662-663, pl. 26, figs. 9-11. H=ANSP 109346a; P=SDNHM 3036-3042; P=CASIZ 064435 (SUTy 7780); P=CASIZ 066425 (ex GeTy 1115).

parana, Zonitoides -- Baker, 1914:632, pl. 21, figs. 12-14. H=ANSP 109314.

pazensis, Triphora johnstoni -- Baker, 1926:235, pl. 24, fig. 6. H=CASIZ 066354 (ex GeTy 2149).

pazensis, Turbonilla (Pyrgolampros) -- Baker, Hanna & Strong, 1928:214-215, pl. 11, fig. 8. H=CASIZ 066074 (ex GeTy 4011).

peleae, Triphora -- Baker & Spicer, 1935:40-41, pl. 5, fig. 6. H=SDNHM 1559 (23765).

perforata, Leptinaria -- Baker, 1914:645-646, pl. 21, fig. 11. H=ANSP 109331. [Preoccupied, see *L. manoreensis* Baker, 1926.]

pilsbryi, Idiopyrgus -- Baker, 1914:658-659, pl. 26, figs. 13-14. H=ANSP 130700; PL=SDNHM 1820.

pilsbryi, Tomigerus -- Baker, 1914:643, pl. 23, figs. 9-10. H=ANSP 109315.

planicosta, Odostomia (Miralda) aepynota -- Baker, Hanna & Strong, 1928:237, pl. 12, fig. 14. H=CASIZ 066094 (ex GeTy 4048); P=CASIZ 066095 (ex GeTy 4049-4053).

porteri, Cerithiopsis (Cerithiopsida) -- Baker, Hanna & Strong, 1938:222-223;, pl. 19, fig. 2. H=CASIZ 065952 (ex GeTy 5455); P=SDNHM 1908-1914.

porteri, Odostomia (Miralda) -- Baker, Hanna & Strong, 1928:236-237, pl. 12, fig. 8. H=CASIZ 066092 (ex GeTy 4047); P=SDMNH 1843.

porteri, Rissoina -- Baker, Hanna & Strong, 1930:30, pl. 1 fig. 15. H=CASIZ 066053 (ex GeTy 4601); P=SDNHM 1908-1914.

porteri, Turbonilla (Pyrgiscus) -- Baker, Hanna & Strong, 1928:217-218, pl. 11, fig. 10. H=CASIZ 066076 (ex GeTy 4013).

quixadaensis, Streptaxis deplanchei -- Baker, 1914:628. H=ANSP 109305 .

rochai, Bulimulus (Rhinus) -- Baker, 1914:636, pl. 23, figs. 19-20. H=ANSP 109058 ; PL=SDNHM 1790-1801 [see Wilson & Kennedy, 1967]; P=CASIZ 064151 (ex SUTy 6185) (2 spec.); P=CASIZ 066420 (ex GeTy 1111).

schereri, Helicina -- Baker, 1914:625-626, pl. 21, figs. 1-2. L=ANSP 109341; PL=ANSP 358657 (2 spec.); P=CASIZ 064434 (ex SUTy 7779); P=CASIZ 066415 (ex GeTy 1109-1110).

slevini, Triphora -- Baker, 1926:231-232, pl. 24, fig. 5. H=CASIZ 066359 (ex GeTy 2143).

smithiagei, Happia -- Baker, 1914:629-630, pl. 22, figs. 3-4. H=ANSP 109300.

spiceri, Cyclostrema -- Baker, Hanna & Strong, 1938a:234-235, pl. 20, figs. 4-6. H=CASIZ 065945 (ex GeTy 5462).

spiritualis, Delphinoidea -- Baker, Hanna & Strong, 1938a:238, pl. 21, figs. 1-3. H=CASIZ 065949 (ex GeTy 5463).

starksi, Doryssa -- Baker, 1914:652-653, pl. 25, figs. 5,6,13,14. H=ANSP 109350; P=SDNHM 1815-1816.

stephensae, Delphinoidea -- Baker, Hanna & Strong, 1938a:238-239, pl. 21, figs. 4-6. H=CASIZ 065951 (ex GeTy 5464).

stephensae, Rissoina -- Baker, Hanna & Strong, 1930:33-34, pl. 1, fig. 14. H=CASIZ 066056 (ex GeTy 4607); P=SDNHM 1916-1917.

stephensi, Triphora -- Baker & Spicer, 1935:42-43, pl. 5, figs. 8-9. H=SDNHM 1561 (23767); P=SDNHM 1562-1563.

strongi, Haminoea -- Baker & Hanna, 1927:130-131, pl. 4, fig. 2. H=CASIZ 032114 (ex GeTy 2517).

subgloriosa, Cerithiopsis (Cerithiopsis) -- Baker, Hanna & Strong, 1938:218-219, pl. 18, fig. 7. H=CASIZ 065934 (ex GeTy 5453); P=SDNHM 1918.

sulcata, Doryssa cachoeriae -- Baker, 1914:656, pl. 25, fig. 10. H=ANSP 109356.

suprapunctatus, Drymaeus linostoma -- Baker, 1914:638-639, pl. 23, figs. 5-8. H=ANSP 109307.

suturalis, Bulimulus (Rhinus) rochai -- Baker, 1914:637, pl. 23, figs. 13-14. H=ANSP 109322; P=ANSP 397245 (2 spec.) [synonymized with *B. rochai* F. Baker, 1914 (pers. comm. D.G. Robinson)]; P=CASIZ 064148 (ex SUTy 6187), (5 spec.); P=CASIZ 066419 (ex GeTy 1108).

taipuensis, Bulimulus (Rhinus) rochai -- Baker, 1914:636, pl. 23, fig. 17. L=ANSP 1099321; PL=SDNHM 1802-1810; P=CASIZ 064152 (ex SUTy 6186); P= CASIZ 066421 (ex GeTy 1106-1107).

tolteca, Turbonilla (Pyrgiscus) -- Baker, Hanna & Strong, 1928:220-221, pl. 11, fig. 13. H=CASIZ 066014 (ex GeTy 4016).

tucunareensis, Doryssa -- Baker, 1914:656-657, pl. 25, figs. 11-12. H=ANSP 109363.

treva, Anachis -- Baker, Hanna & Strong, 1938b:251, pl. 24, fig. 4. H=CASIZ 065954 (ex GeTy 5820).

vanduzeei, Triphora -- Baker, 1926:228-229, pl. 24, fig. 8. H=CASIZ 066355 (ex GeTy 2139); P=CASIZ 066356 (ex GeTy 2140).

vizcainoana, Odostomia (Chrysallida) -- Baker, Hanna & Strong, 1928:229-230, pl. 12, fig. 10. H=CASIZ 066086 (ex GeTy 4034); P=CASIZ 066087 (ex GeTy 4035-4037).

zamboangoensis, Turbonilla (Strioturbonilla) -- Baker & Spicer, 1930:176-177, pl. 19, fig. 2. H=SDNHM 665 (18296); P=SDNHM 3303.

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TRIGONIOCARDIA (AMERICARDIA) BIANGULATA (BRODERIP & SOWERBY, 1829) FROM OFF CATALINA ISLAND

JULES HERTZ

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105

Abbott (1974) reports the distribution of *Trigoniocardia (Americardia) biangulata* (Broderip & Sowerby, 1829) as southern California to Ecuador. Finet (1985) included Islas Galápagos, Ecuador in its distribution. This bivalve is not often found in southern California. Hertz & Hertz (1992) reported finding it in Mission Bay, San Diego. Adrian Valli, a member of the San Diego Shell Club, found three specimens in July 1992 at a depth of 27 m (90 ft) in muddy sand off Casino Point, Catalina Island, California. One of the specimens shown in Figure 1 is orange in color. Alongside it is the lighter, more common color form, which Adrian found in Bahía Concepción, Baja California Sur, Mexico in sand in three feet of water. He has also found a completely white specimen in Bahía Concepción.

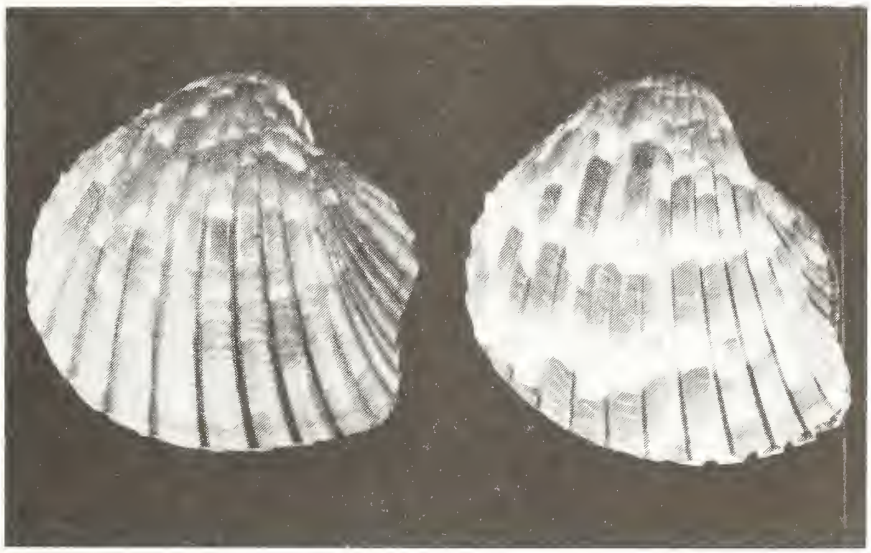

Figure 1. *Trigoniocardia (Americardia) biangulata* (Broderip & Sowerby, 1829). Left: orange-colored specimen; right: specimen with usual coloration.

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1994 LOW TIDES FOR THE NORTHERN GULF OF CALIFORNIA

The entries listed below show only periods of low tides of -4.0 feet and below. The times of low tides are given in Mountain Standard Time. To correct for San Felipe, subtract one hour from listed times which are for Puerto Peñasco (San Felipe is on Pacific Standard Time). Tides below the midriff of the Gulf cannot be estimated using these entries.

January
9. -4.0 at 6:30 PM
10. -4.5 at 7:00 PM
11. -4.8 at 7:40 PM
12. -4.3 at 8:10 PM
25. -4.0 at 6:40 PM
26. -4.8 at 7:15 PM
27. -5.2 at 8:00 PM
28. -5.0 at 8:30 PM
29. -4.1 at 9:00 PM

February
8. -4.0 at 7:00 PM
9. -4.1 at 7:40 PM
10. -4.0 at 8:10 PM
23. -4.0 at 6:15 PM
24. -5.0 at 7:00 PM
25. -6.0 at 7:20 PM
26. -4.3 at 8:00 AM
-5.7 at 8:10 PM
27. -5.4 at 8:30 AM
-4.3 at 9:00 PM
28. -4.7 at 9:10 AM

March
25. -4.2 at 6:15 PM
26. -4.4 at 7:00 AM
-5.0 at 7:10 PM
27. -6.0 at 7:30 AM
-4.7 at 8:00 PM
28. -6.2 at 8:00 AM
-4.0 at 8:40 PM
29. -6.0 at 8:40 AM
30. -4.4 at 9:10 PM

April
24. -5.5 at 6:40 AM
25. -6.1 at 7:10 AM
26. -6.3 at 7:50 AM
27. -6.0 at 8:30 AM
28. -4.4 at 9:10 AM

May
23. -4.7 at 6:15 AM
24. -5.8 at 7:00 AM
25. -6.0 at 7:45 AM
26. -5.5 at 8:15 AM
27. -4.0 at 9:00 AM

June
22. -4.4 at 6:40 AM
23. -5.0 at 7:20 AM
24. -4.4 at 8:10 AM

July
22. -4.0 at 7:40 AM
23. -4.0 at 8:00 AM

August
none

September
5. -4.0 at 7:40 AM

October
4. -4.6 at 7:15 PM
5. -5.2 at 7:50 PM
6. -4.6 at 8:15 PM
7. -4.0 at 9:10 PM

November
1. -4.0 at 6:10 PM
2. -5.2 at 6:50 PM
3. -6.0 at 7:10 PM
4. -5.6 at 8:00 PM
5. -4.2 at 8:40 PM
30. -4.1 at 5:50 PM

December
1. -5.7 at 6:10 PM
2. -6.1 at 6:25 PM
3. -6.0 at 7:10 PM
4. -5.2 at 8:00 PM
30. -5.2 at 6:30 PM
31. -6.0 at 7:15 PM

A BOUND VOLUME OF THE THESAURUS CONCHYLIORUM TO BE SOLD AT AUCTION

The San Diego Shell Club will be selling at its annual auction in April a hardbound volume of the **Thesaurus Conchyliorum**. The volume is in excellent condition with very few faint signs of foxing and hand-tipped color plates in perfect condition. The bound volume (no frontispiece) includes the following sections:

Vol. I: Part 1 (May 1842) *Apporhais, Rostellaria, Struthiolaria* (pp 21-24, pl. 5)
Part 4 (Apr. 1844) *Scalaria* (pp. 83-108, pls. 32-35), *Columbella* (pp. 109-146, pls. 36-40)
Part 6 (Jan. 1846) *Tellina* (pp. 221-333 + alphabetical index pp. 333-335, pls. 56-66), *Plicatula* (pp. 435-437, pls. 90-91), *Pedum* (p. 438, pl. 91)
Part 3 (June 23, 1843) [with cover], *Lima* (pp. 83-88, pls. 21-22), *Cyclostoma* (pp. 89-168, pls. 23-31, [27, 28 as 17, 18], suppl. pls. 31 a,b)
Vol. II: Part 10 (1849) *Neritina* (pp. 507-543, pls. 109-116) + alphabetical index (pp. 544-546)

Library plate from Jean & Crawford Cate
[Cate name embossed on several pages in text]

The San Diego Shell Club will be accepting mailed bids up to March 31st; the volume will be sold at the Club's annual auction in April 1994. A definite date for the auction will be set early in 1994.

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Baja: From the Coronado Islands to Sierra de San Francisco

Award-winning photographer and Club member, Richard Herrmann will give an illustrated program traveling from underwater at the Islas Coronados to the rock art of the Sierra de San Francisco.

Shells of the month: Rock Shells (Thaididae)
Meeting date: February 17th

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - January 20, 1994

At 7:45 p.m. the meeting was called to order by President Hugh Bradner who began the first meeting of the year with a very nice review of the Club's activities, contributions and accomplishments.

After an introduction of guests, the minutes were accepted as published in **The Festivus**. Hugh then suggested that this year the hospitality chairperson be aided each month by those supplying the refreshments. Those persons are asked to arrive early that month.

Several announcements were also made: to be included on the Club membership roster, dues must be paid by January 31st. Kim and Linda Hutsell will be returning in June. Don Pisor has a book collection for sale--a list of those books is available to members. The Bizarre Bazaar will be held on the afternoon of May 14th in the Mulliner's garden.

A card for Rose D'Attilio, who is recovering from a stroke suffered late last year, was available for signing. Rose is now recuperating at home.

A going-away party for Michael Hollmann and Sherry and Adrian Valli will be on Saturday, February 12th at 6:00 p.m. at the home of Don and Kim Avilez. [See next column.]

Wes Farmer, Botanical Garden Foundation representative, informed the membership of some changes to be made in the meeting room.

Whether or not the Club should subscribe to the periodical, **World Shells**, was discussed. A decision will be made later.

Carole Hertz announced that the Club's auction/potluck will be held at Wes Farmer's Clubhouse on Saturday evening, April 16th. Members were asked to search their collections and bring in their shells for donation, or contact a board member to arrange for pickup. A rare cowry, *Cypraea marginata ketyana* has been donated anonymously to the auction [see page 26] as well as a volume of the beautiful **Thesaurus Conchyliorum.**

The speaker for the evening was member Terry Arnold who gave a very interesting and informative talk on southern California fossils and local sites. Terry's knowledge of his subject and his slides of area sites and some of the beautiful molluscan fossils he'd found were of great interest to our members. As a result of his talk, future trips to fossil sites were discussed.

Following Terry's presentation there were two shell drawings. the regular drawing was won by Kay Klaus and the special drawing, donated by the Bradners, was won by Wes Farmer.

The refreshments were provided by Kay Klaus and Marge and Hugh Bradner.

Rick Negus

A Going-Away Party at the Avilez's Home

Michael Hollmann will be leaving San Diego to return to Germany and Adrian, Sherry and Dylan Valli will be relocating to Costa Rica. The Club will miss them and this recepion is in their honor.

Come to this appetizer-potluck, at the home of Don and Kim Avilez, 5481 Los Robles, Carlsbad. It will begin at 6:00 p.m. RSVP (438-4460 [Avilez] or 792-5404 [Larry Buck].)

A Video Missing from the Club Library

If you've borrowed the Club video, "Dredging in the Sea of Cortez" by Carol and Paul Skoglund, will you please check to make sure you have returned it to the Club library. Both the video and the library card are missing, making it difficult to trace the borrower. Please contact Librarian Margaret Mulliner (488-2701) if you have the video.

John D. Isaacs Scholarship Available

Informational brochures and applications for the $10,000 John D. Isaacs college scholarship ($2500 for each of four years) are available. California high school seniors who have entered a marine science project in a science fair are eligible. Application deadline is April 8, 1994. For further information write to Isaacs Committee, California Sea Grant College, University of California, San Diego, 9500 Gilman Dr., La Jolla, CA 92093-0232 (phone (619) 534-4442).

SOME COMMENTS ON (?)*POIRIERIA (PAZINOTUS) SIBOGAE* (SCHEPMAN, 1911) (GASTROPODA: MURICIDAE)

Roland Houart

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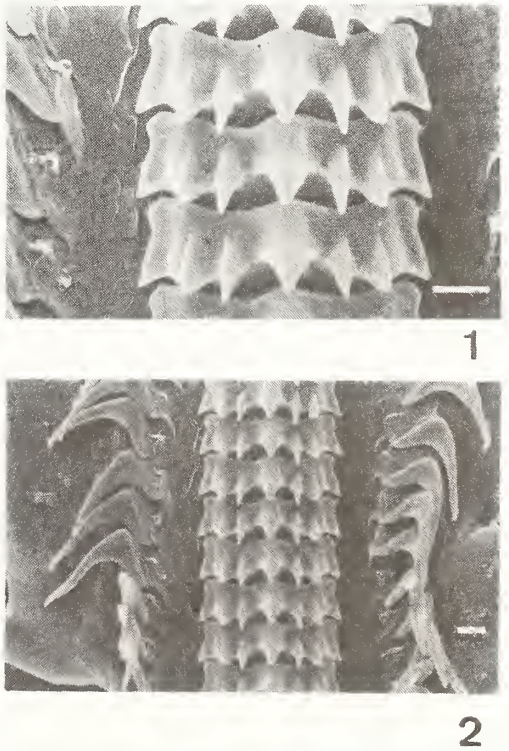
A species of (?)*Poirieria (Pazinotus)* from the New Caledonian region, recently collected by the Muséum National d'Histoire Naturelle, Paris, was compared with the holotype of *Latiaxis sibogae* Schepman, 1911, stored in the Zoological Museum of the University of Amsterdam (Netherlands). Except for the apertural lip which is juvenile, thin and fragile in the holotype, all other shell features could be carefully compared. Spiral and axial sculpture, spines, siphonal canal and white colour are identical in the specimens from New Caledonia and in the holotype of *L. sibogae*. The protoconch is broken in all specimens including the holotype but remaining fragments suggest it is paucispiral. The holotype (Figures 5 & 6), with a juvenile outer apertural lip, has one teleoconch whorl less than the New Caledonian specimen illustrated in Figures 3 and 4 which accounts for its smaller size.

The species is listed in D'Attilio (1978:22) and in Clover (1982: pl. 15) as a *Latiaxis*, while Kosuge and Suzuki (1985:22) considered it a *Babelomurex (Echinolatiaxis)*. Together with the holotype, Kosuge and Suzuki (1985, pl. 1, figs. 1, 2; pl. 34, fig. 9) figured two other specimens (locality not mentioned), but besides their light pinkish colour, the illustrated specimens have more numerous and narrower spines and spinelets, a somewhat broader aperture and a more acute spire. They are two specimens of Coralliophilidae, not conspecific with (?)*Poirieria (Pazinotus) sibogae*.

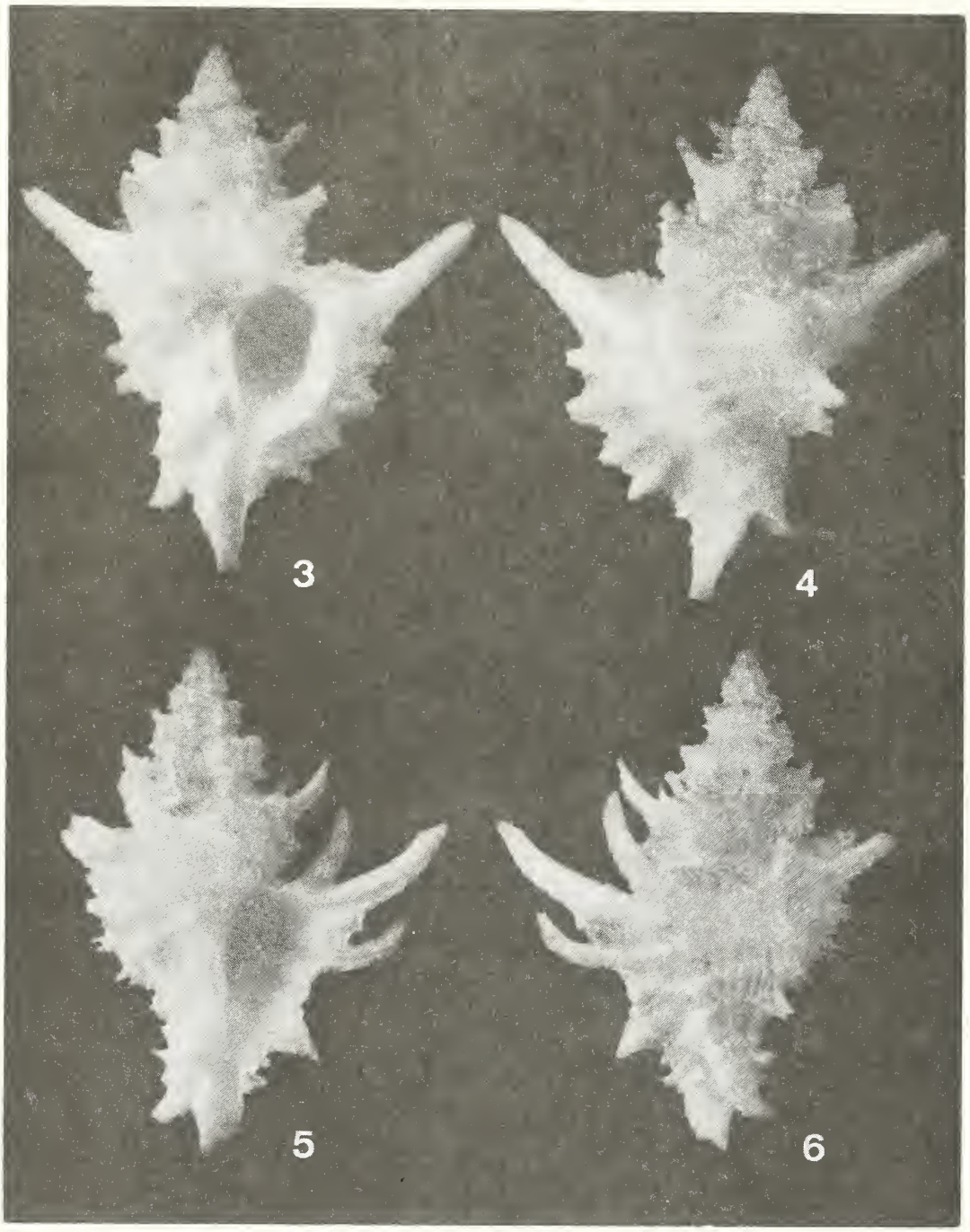
The classification of (?)*P. sibogae* in the family Muricidae instead of the Coralliophilidae, as originally combined, is verified by the presence of a radula in a specimen from New Caledonia.

The radula of (?)*P.(P.) sibogae* (Figures 1, 2) consists of a serrated rachidian tooth with a single, unicuspid, sickle-shaped lateral tooth on each side. The rachidian bears a short central projecting cusp and two long lateral denticles situated between the central and marginal cusps.

Pazinotus has been used usually as a subgenus of *Poirieria* Jousseaume, 1880 (a genus of the Muricinae), but the radular morphology of (?)*P. sibogae* (Figures 1, 2) and of *P. spectabilis* Houart, 1991, fig. 39, is muricopsine. As noted in Vokes (1992:35), because of the scabrous surface ornamentation these species are probably more akin to *Pygmaepterys* Vokes, 1978, a genus of the Muricopsinae and a new subgeneric taxon will probably prove necessary.



Figures 1, 2. Radula of specimen of (?)*Poirieria (Pazinotus) sibogae* shown in Figures 3, 4. Scale bars 10 μm.



Figures 3-6. (3, 4) (?)*Poirieria (Pazinotus) sibogae* (Schepman, 1911). 26 mm. Coral Sea, Nova Bank (22°08'S, 159°21'E), 375-415 m, MNHN. (5, 6) (?)*P. (P.) sibogae*. Holotype ZMA 3.11.092. 16.5 mm. Pulu Kaniiungan ketjil.

Since the radular morphology of (?)*Poirieria (Pazinotus) stimpsonii* (Dall), the type species of *Pazinotus*, is not known, it is not yet possible to determine if *Pazinotus* is muricine and probably a subgenus of *Poirieria*, or muricopsine related to *Pygmaepterys*.

ACKNOWLEDGMENTS

I am grateful to Dr. R. G. Moolenbeek (University of Amsterdam, Zoologisch Museum) for the loan of the type material, and to Dr. P. Bouchet (Muséum National d'Histoire Naturelle, Paris) and A. Warén (Swedish Museum of Natural History, Stockholm) for preparation and SEM work of the radula.

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SAN MIGUEL ISLAND DIVE --'93

LARRY BUCK

2411 El Amigo Road, Del Mar, California 92014

This past October, a group of twenty-five of our club's divers and their friends spent a fabulous two days of diving at San Miguel and Santa Rosa Islands. The 1993 trip seemed the best ever with more dives possible including one night dive. The skipper Bill Magee, wife Sherry (also the cook), and the rest of the crew from the charter boat, **Peace**, once again put themselves out to accommodate us. The food was terrific and we had the boat all to ourselves--the hot tub got alot of use.

Along with a sprinkling of newcomers, were many divers from previous years' trips. With a flat ocean, we dove the best dive spots such as Wilson Rock, Castle Rock and Talcott Shoals. Many abalone and rock scallops were taken and I even found another world record shell, a *Norrisia norrisi*. The 68.7+ mm shell in excellent condition and covered with barnacles, was collected dead on the bottom. I also found a *Hinnites giganteus* measuring 233 mm which ties the world's record for this species.

This year's trip, in August, will be an attempt to dive San Nicolas Island along with Begg Rock and then Santa Barbara Island on the return trip. Start saving your money now and reserve your spot. Last year's trip filled up quickly.

BOOK NEWS

Handbook of Systematic Malacology
by Johannes Thiele
Scientific editors of translation: Rüdiger Bieler and Paula M. Mikkelsen. 1992
Published by: Smithsonian Institution Libraries & The National Science Foundation, Washington, D.C., 1189+ pages
Price: Part 1, $77, Part 2, $61 [from American Malacologists, P.O. Box 2255, Melbourne, FL 32902-2255]

For anyone not fluent in German, the English translations of Johannes Thiele's "Handbook of Systematic Malacology, Parts 1 & 2" is a godsend. Part 1 covers the Polyplacophora and the Prosobranch Gastropoda. Part 2 covers the other two gastropod subclasses, Opisthobranchia and Pulmonata. An index is found at the end of each volume, whereas in the German volumes only one index was put at the end of Part 2.

Where I have had to refer to Thiele in the indentification and classification of our specimens, I have found the English version very easy to use. In instances where anatomical descriptions appeared inadequate, we have verified that the fault lay with the original Thiele and not the translators. But even these scant references to anatomy are better than none, as in Zilch's "Euthyneura".

It is to be hoped that someday we may see Engish translations of Part 3 (Scaphopoda, Bivalvia, and Cephalopoda) and Part 4 which discuss the foundations of classification, phylogeny, paleontology, geographical ranges and nomenclature of mollusks.

Many thanks to Rüdiger Bieler and Paula Mikkelsen for a very valuable publication.

Walter B. Miller,
Santa Barbara Museum of Natural History

ANNOUNCEMENT OF NEW PUBLICATIONS

The Prosobranch Snail Family Hydrobiidae (Gastropoda: Rissooidea); Review of Classification and Supraspecific Taxa. Smithsonian Contributions to Zoology, Number 547
By: Alan R. Kabat and Robert Hershler. 1993
Published by: Smithsonian Institution Press, Washington, D.C., 94 pages, 4 tables

In this monograph the "Hydrobiidae are redefined and differentiated from other rissooidean families, and a review of the classification of this family is presented." Seventy-five family level names and 725 generic level-names are discussed in this family of freshwater and brackish-water gastropods.

This monograph will be available for circulation in the Club library at the February meeting.

Sea Slugs of Western Australia
By: Fred E. Wells and Clayton W. Bryce. 1993
Published by: Western Australian Museum
Price: $29.95 plus $2.80 postage

Announcement of this "colourful field guide" has been received from the Malacological Society of Australia. The guide, "with over 200 photographs" is available from the Western Australian Museum Bookshop (09)427 2776 or the Publications Department (09) 427 2779, FAX (09) 227-9989, Western Australian Museum, Francis Street, Perth, Western Australia 6000.

CORRECTIONS AND NOTES REGARDING THE NATICIDAE LISTED BY POPPE & GOTO (1991) IN "EUROPEAN SEASHELLS"

MICHAEL HOLLMANN

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In 1991 a long-felt need for a comprehensive, well-illustrated book on European seashells was met when Guido T. Poppe of Belgium and Yoshihiro Goto of Japan teamed up to publish the first volume of EUROPEAN SEASHELLS, containing the Polyplacophora, Caudofoveata, Solenogastres, and Gastropoda. The book's stated purpose was to serve as an overview and guide for the amateur shell collector, covering the more readily accessible species of European shells. In their introduction the authors stressed that their book had "no scientific pretentions", and that only a few original descriptions or types had been consulted. Given the awesome magnitude of the task to cover all families within the four classes of mollusks mentioned above, and considering the huge geographical area covered, taxonomical errors and misidentifications are unavoidable.

The purpose of this article is to point out some errors observed in the section on the family Naticidae. Since EUROPEAN SEASHELLS undoubtedly will become one of the primary references for identification of European species for shell collectors and shell dealers alike, this author felt it was important to alert fellow collectors to some of these taxonomical problems. Some of these errors have previously been pointed out by Marc Streitz in a note published in 1992 in XENOPHORA, the journal of the French shell collectors' club, Association Francaise de Conchyliologie. The corrections listed below should not take away from the overall usefulness of this important new book which should be a "must" on every shell collector's shelf.

In Table 1 the correct names are given for those 10 out of the 33 Naticidae specimens figured on plates 16, 17, and 18 which have been wrongly identified. In addition to these actual misidentifications, a number of nomenclatural errors occur which do not affect species identification per se but lead to the use of junior synonyms instead of the valid names. These errors will be addressed in the nomenclatural comments following the table.

Table 1. List of Misidentified Naticidae Figured on Plates 16-18 of EUROPEAN SEASHELLS, Volume 1

Figure(s) (pl./fig.)	Identification by Poppe & Goto (1991)	Correct Identification
17/4	*Lunatia montagui* (Forbes, 1838)	*Euspira pallida* (Broderip & Sowerby, 1829)
17/8	*Lunatia pallida* (Broderip & Sowerby, 1829)	*Euspira montagui* (Forbes, 1838)
17/11	*Natica adansoni* Blainville, 1825	*Natica prietoi* Hidalgo, 1873
17/12	*Natica maroccana* (Chemnitz, 1781)	*Natica canariensis* Odhner, 1931
17/14	*Natica variabilis* Recluz *in* Reeve, 1855	*Natica vittata* (Gmelin, 1791)
17/15,16	*Naticarius canariensis* (Odhner, 1931)	*Natica marochiensis* (Gmelin, 1791)
17/21,22	*Sinum haliotoideum* (Linnaeus, 1758)	*Sinum bifasciatum* (Récluz, 1851)
18/4	*Payraudeautia intricata* (Donovan, 1804)	*Natica vittata* (Gmelin, 1791)

Additional Nomenclatural Comments

(All page and plate numbers given refer to Poppe & Goto (1991)

Naticarius cruentatus (Gmelin, 1791) [pp. 37, 119, pl. 16, figs. 18-20] is a junior synonym of *N. hebraeus* (Martyn, 1784), a name which has been declared a *nomen conservandum* in Opinion 1662/1992 of the International Commission on Zoological Nomenclature (ICZN) in spite of its publication in a work rejected by ICZN Opinion 457/1957 for not being consistently binomial. Therefore, this species has to be called *Naticarius hebraeus* (Martyn, 1784). (Poppe & Goto's book was published in 1991, when this information was not yet available.)

Naticarius punctatus (Chemnitz *in* Karsten, 1789) [pp. 37, 119, pl. 16, figs. 21-23] should rather read *N. punctatus* (Karsten, 1789) because Karsten validated Chemnitz' non-binomial name. However, the name *punctatus* Karsten, 1789 [*Nerita*] is not available (as the authors themselves point out on page 120) since it is preoccupied by (it is a primary homonym of) *punctatus* O. F. Müller, 1774 [*Nerita*], with both these species having been described in the genus *Nerita*. Therefore, this species must be called by the next available name, which is *Naticarius stercusmuscarum* (Gmelin, 1791).

The genus *Lunatia* Gray, 1847 [p. 37, 117-118, pl. 17, figs. 1-9] is a junior synonym of *Euspira* Agassiz, 1838, *fide* Marincovich (1977), Kabat (1991); see also Streitz (1992).

Lunatia pulchella (Risso, 1826) [pp. 37, 118, pl. 17, fig. 9] is a junior synonym of *Euspira nitida* (Donovan, 1804) *fide* Sabelli *et al* (1990); see also Streitz (1992).

Natica maroccana (Chemnitz, 1781) [pp. 37, 118, pl. 17, fig. 12] is a name suppressed by ICZN Dir. 1/1954 because it was proposed in a non-binomial work, and is therefore unavailable. The next available name is *Natica marochiensis* (Gmelin, 1791). However, as also noted by Streitz (1992), the species figured in pl. 17, fig. 12 is <u>not</u> *N. marochiensis* (Gmelin, 1791) but rather *Natica canariensis* Odhner, 1931 (see Table 1).

Natica variabilis Récluz *in* Reeve, 1855 [pl. 17, fig. 14] should read *Natica variabilis* Reeve, 1855, *ex* Récluz MS, since Reeve used a manuscript name by Récluz when he described *N. variabilis* in his CONCHOLOGIA ICONICA. However, the specimen figured is <u>not</u> *N. variabilis* Reeve *ex* Récluz MS, 1855 but rather *N. vittata* (Gmelin, 1791), as mentioned in the table.

Natica prietoi Hidalgo, 1873, is listed [p. 119] as a synonym of both *N. maroccana* (Chemnitz, 1781) and *N. variabilis* (Reeve, 1855) which is not true in either case. *Natica prietoi* Hidalgo, 1873, is a valid species (and nicely figured on pl. 17, fig. 11), although with a wrong name) and quite different from *N. maroccana* (Chemnitz, 1781) as well as from *N. variabilis* (Reeve, 1855, *ex* Récluz MS).

Both *Naticarius vittatus* (Gmelin, 1791) [pp. 37, 120, pl. 17, figs. 17-18, and also fig. 14] and *Naticarius dillwynii* (Payraudeau, 1826) [pp. 37, 119, pl. 17, fig. 23] belong to the genus *Natica* rather than *Naticarius*.

Neverita josephina (Risso, 1826) [pp. 37, 120, pl. 17, fig. 20] is a -- quite commonly found -- misspelling for *N. josephinia* (Risso, 1826).

The date for *Tectonatica filosa* (Philippi) [pp. 27, 121, pl. 18, fig. 3] is 1845, not 1844. It should be mentioned here that *Tectonatica filosa* (Philippi, 1845) may actually be a junior synonym of *T. sagraiana* (d'Orbigny, 1842). Although d'Orbigny described *Natica sagraiana* from Cuba, his detailed description and excellent figure strongly suggest that the species he described is conspecific with the Mediterranean/West African *T. filosa* (Philippi, 1845). D'Orbigny reports that he received the specimen he described from Ramón de la Sagra, and it is conceivable that the locality "Cuba" is an error and that the specimen actually was of Mediterranean/West African origin. To my knowledge, no specimens answering the description of *T. sagraiana* (d'Orbigny, 1842) have since been reported from the Caribbean.

It should be noted that some authors (*e.g.*, Sabelli *et al*, 1990) regard *Tectonatica affinis* (Gmelin, 1791) [pp. 37, 120, pl. 18, fig. 1] and *T. clausa* (Broderip & Sowerby, 1829) [pp. 37, 120, pl. 18, fig. 2] as conspecific. Other authors (*e.g.*, Marincovich, 1977) stopped short of declaring the two species conspecific but stated that all alleged *T. affinis* (Gmelin, 1791), examined in museum collections appeared to be unseparable from *T. clausa* (Broderip & Sowerby, 1829). If this can be confirmed by further research, the name *T. affinis* (Gmelin, 1791), would take precedence over *T. clausa* (Broderip & Sowerby, 1829).

Sinum haliotoideum (Linnaeus, 1758), has been used by many authors as the name of the

Mediterranean species of *Sinum*. However, Kabat (1990) concluded that the Linnaean species *Sinum haliotoideum* actually is conspecific with an Indo-Pacific species which commonly had been called *Sinum planatum* (Réeluz, 1843). Kabat designated a lectotype for *S. haliotoideum* (Linnaeus, 1758), and the specimen he selected and figured (Kabat, 1990:8, fig. 1 C.D.) is a *Sinum* with no spiral sculpture, quite unlike the European species of *Sinum*. The next available name for the Mediterranean species of *Sinum* figured by Poppe & Goto is *Sinum bifasciatum* (Récluz, 1851). However, *Sinum bifasciatum* (Récluz, 1851) was originally described from the West African faunal province, and it is not entirely clear whether it ranges into the Mediterranean, and if so whether it actually is conspecific with the *Sinum* reported from the Mediterranean. Dixon and Ryall (1986) reported that they could find no distinguishing features between the Mediterranean and West African *Sinum* they examined. Streitz (1992) noted that to his knowledge no living *Sinum* has ever been found in the Mediterranean and that dead specimens reported from the Alboran Sea (the entrance to the Mediterranean) most likely are of West African origin and represent *Sinum bifasciatum*. This author, however, has several specimens of *Sinum* with believable data from Mediterranean locations (Malaga and Marbella, Spain, and Egadi Island, Sicily, Italy) in his personal collection, and these specimens appear to have been collected live. Should future research show that the Mediterranean *Sinum* represent a separate species, an available name would be *Sinum philippii* (Weinkauff, 1883).

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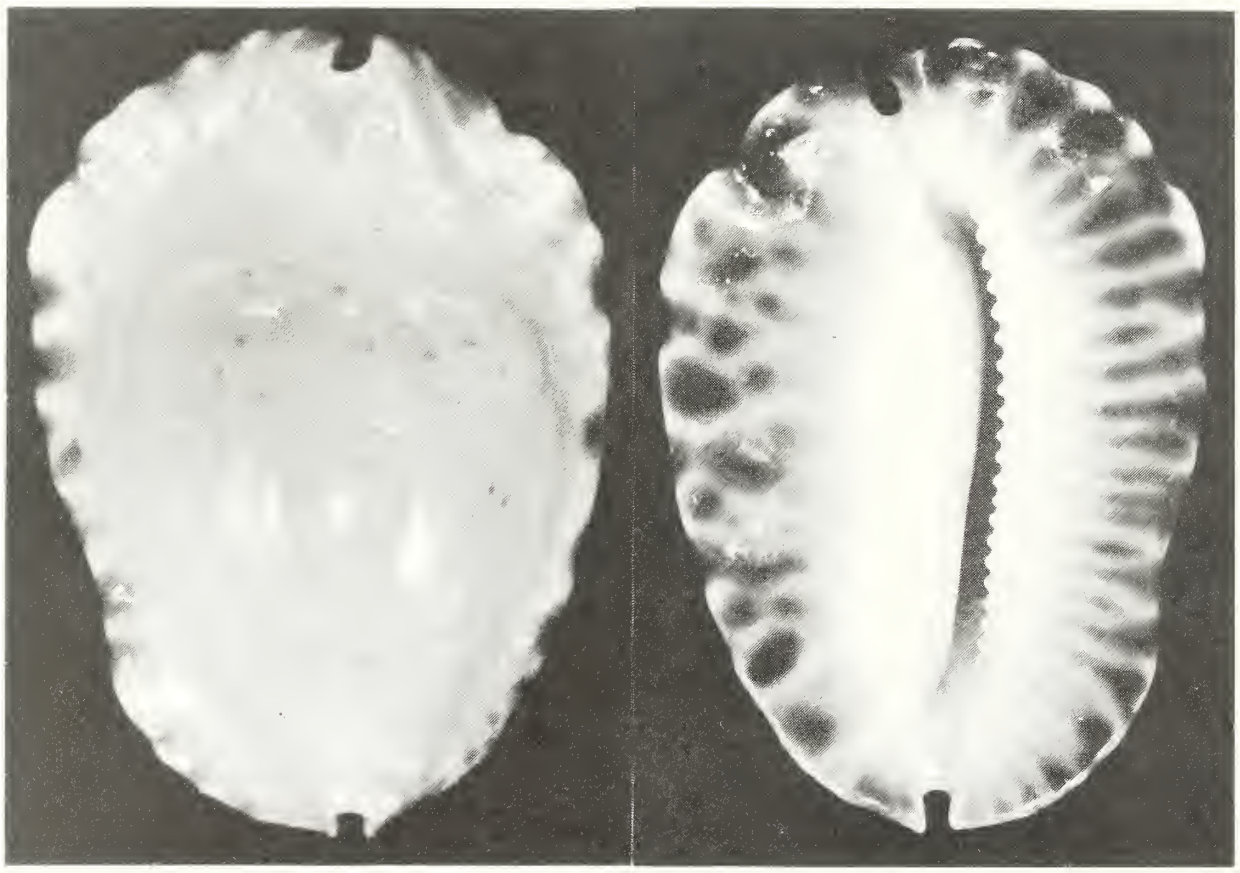
A *CYPRAEA MARGINATA KETYANA* AT THE SAN DIEGO SHELL CLUB AUCTION

A specimen of the beautiful *Cypraea marginata ketyana* Raybaudi, 1978, the gift of an anonymous donor, will be sold at the upcoming San Diego Shell Club auction/potluck on April 16th.

This mature 50 mm long, shell (Figures 1 & 2) was collected near an offshore island in the Shark Bay area off Carnarvon, Western Australia on sponge in 35 meters. The shell with its cream colored dorsum and cream to orange to brown apertural area is a rarity in collections and highly sought after. A small under-the-nacre bump and a slight chip in the dorsal nacre can be seen under close examination.

As with the bound volume of the **Thesaurus Conchyliorum** [see January issue, page 16], mail-in bids will be accepted for this shell.



Figures 1, 2. *Cypraea marginata ketyana* Raybaudi, 1978, dorsal and apertural views. Photos: David K. Mulliner

SAN DIEGO SHELL CLUB
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THE FESTIVUS

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Volume: XXVI | March 10, 1994 | Number: 3

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

The Art of Shaking and its Rewards
and
A Visit with My Ancestors and Collecting in Borneo

Donald R. Shasky, Club member and world traveler, will present a slide show both on his recent collecting trip to Borneo and on the techniques he uses for collecting micromollusks.

Book and Reprint Sale

Meeting date: March 17, 1994
Shells of the month: *Spondylus*

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - February 17, 1994

At 7:40 p.m. the meeting was called to order by President Hugh Bradner. Minutes of the January meeting were approved as published in **The Festivus**.

During the business portion of the meeting there were several announcements. Carole Hertz requested that members donate material for the Club auction. March is the last available month for donations [see col. 2]. Librarian Margaret Mulliner asked that members return their books promptly and remember to cross off their names on the library cards and replace them in the books. John Jackson announced the availablility of Volume 1 of Barry Wilson's new **Australian Marine Shells**. He also donated a set to the Club library.

Larry Buck announced that some Club members will be going to El Golfo, Baja California for the low tides at the end of April. If you are interested, contact Larry (619) 792-5404.

Marge Lindahl won the shell drawing and Terry Arnold and Michael Hollmann provided the cookies for the refreshment break.

Larry Buck introduced speaker Richard Herrmann, who took the Club on a trip from the waters off the Coronado Islands to the caves of rock art in the Sierra de San Francisco. Richard's beautiful slides of the underwater (and above water) life in the waters of the Coronados were followed by the fantastic views of Baja in bloom as Richard traveled across the peninsula to the Sierra. His tour to the rock art caves was by mule down the side of the sheer mountain. The lush views were a side of Baja that many had never seen and the incredible views of the life size rock art paintings were marvelous. Most of those in attendance were disappointed when the program ended.

Following the program, members enjoyed refreshments and socializing.

Too Late for the Roster

Avilez, Don and Kim, 5481 Los Robles, Carlsbad, CA 92008, (619) 438-4460

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Webster, Herb and Mella, 34021-A Ruby Lantern, Dana Point, CA 92629, (714) 240-1606

The Pacific Shell Club Presents Its First Shell Show

The Pacific Shell Club announces its first shell show on May 1, 1994 from 10 a.m. to 5 p.m. at the Cabrillo Marina Community Building, Berth 28, in San Pedro. [22nd St. to Via Cabrillo Marina, turn south to Berth 28, parking on right]. Admission and parking are free. There will be exhibits, auction, raffle, snack shack, and shells for sale.

For further information call Frank Jewett (310) 514-8012, Ann Billings (310) 207-2318 or Dave Nesheim (310) 541-1568.

The Club's Annual Auction/Potluck

The Club's annual auction/potluck will be held on Saturday evening April 16th from 6-11 p.m. in the community room of Wes Farmer's condo at 3591 Ruffin Rd., San Diego, CA 92123 [map will be in the April issue].

This is the Club's big fundraiser and the biggest social event of the year. Your help is needed to make it a success.

Please either bring your shell donation, with data, to the March meeting or contact Carole Hertz 277-6259 or Larry Buck 792-5404 to arrange for pickup.

The annual auction provides the Club with the funds necessary to support its many activities such as **The Festivus**, Club library purchases, donations toward student grants, Greater San Diego Science Fair participation as well as the Club's social functions.

Please look through your collections and help make the Auction a huge success.

ON A "PROBLEM" *SIPHOCYPRAEA* HEILPRIN, 1887, FROM THE PLIOCENE/PLEISTOCENE OF FLORIDA

TERRY S. ARNOLD

2975 B Street, San Diego, California, 92102

INTRODUCTION

Recently three specimens of *Siphocypraea* Heilprin, 1887, came into the author's possession. These specimens appear to fall outside the usual range of variation for any of the previously described species in this highly variable genus.

BACKGROUND

The members of this genus are characterized by having an apex in a crater-like depression. This feature is unique within the family Cypraeidae[1] and is the primary diagnostic feature (Dall, 1890; Heilprin, 1887) distinguishing *Siphocypraea* from the other genera of Cypraeidae[1]. *Siphocypraea* has been further subdivided into two subgenera, *Siphocypraea sensu stricto* and *Muracypraea* Woodring, 1957 (Olsson & Petit, 1964). In the opinion of several authors the species assigned to *Muracypraea* are more closely related to the *Barycypraea* and should be referred to that genus (Kay, 1990; Lilltved & Le Roux, 1988). *Siphocypraea s. s.* first appeared in the Lower Miocene (Chipola Formation) of northwestern Florida, spreading in the middle Pliocene to North Carolina (Yorktown & Duplin Formations), South Carolina (Duplin Formation) and north Florida (Jackson Bluff Formation). During the Upper Pliocene through early Pleistocene in southern Florida, *Siphocypraea* developed into a bewildering variety of forms, becoming extinct in the early Pleistocene. At least nine of the Upper Pliocene-Lower Pleistocene forms have been described. The stratigraphy of the southeastern United States has been extensively studied for over 100 years (Dall, 1903; Heilprin, 1887). Unfortunately, like many other heavily studied subjects there is a significant amount of disagreement and duplication in the literature.

Table 1 shows a summary of the late Tertiary-early Quaternary stratigraphy of *Siphocypraea*-bearing strata. The formation names, regional correlations and geological age assignments are a compilation of the most recent data available tempered by retaining the formation names most commonly used in paleontology literature (Missimer, 1992; Ward, 1992). While the age assignments of the Duplin, Yorktown, and Jackson Bluff Formations (Ward, 1992) represent a significant revision from age assignments by earlier workers (Mansfield, 1943) the correlations and relative stratigraphy are in complete agreement.

This author is aware of the following currently described species and subspecies in *Siphocypraea s. s.*:

S. carolinensis carolinensis (Conrad, 1841)
S. carolinensis floridana (Mansfield, 1931)
S. chilona (Dall, 1900)
S. griffini Petuch, 1991
S. hertweckorum Petuch, 1991
S. hughesi Olsson & Petit, 1964
S. lindae Petuch, 1986
S. nulepenensis Petuch, 1991
S. pilsbryi (Ingram, 1939)
S. problematica (Heilprin, 1887)

[1] For the purposes of this paper *Siphocypraea* is used as a genus of the family Cypraeidae as designated by Olsson & Petit and used by most recent authors (Olsson & Petit, 1964, 1968; Parodiz, 1988; Petuch, 1988, 1991; Schilder, 1965) studying this "group" of fossil species. Some authors have treated *Siphocypraea* as a subgenus of the genus *Cypraea* (Dall, 1890; DuBar, 1958; Heilprin, 1887; Olsson & Harbison, 1953). Readers who prefer the latter usage may read all occurrences of *Siphocypraea* as *Cypraea (Siphocypraea)* without any loss of meaning or risk of misinterpretation.

S. trippeana Parodiz, 1988
S. transitoria Olsson & Petit, 1964

The stratigraphic and geographic distribution of the described *Siphocypraea* are shown in Table 1 (Dubar, 1958; Gardner, 1943, 1947, 1948; Olsson & Petit, 1964; Petuch, 1991, 1992).

The described species of *Siphocypraea s. s.* can be placed into categories based on a variety of shell characteristics. Two of the most consistent are form of the posterior canal and width of the aperture. Table 2 categorizes the described species using these characteristics. These categorizations are based on published descriptions and illustrations (Dall, 1890; Gardner, 1947, 1948; Heilprin, 1887; Olsson & Harbison, 1953; Olsson & Petit, 1964; Parodiz, 1988; Petuch, 1988, 1991, 1992). A comparison of the category membership of Table 2 and the stratigraphic ranges of Table 1, suggests that the constant width aperture and curved posterior canal are characters that may have evolved from the earlier wide anterior aperture straight posterior canal form typified by *S. c. carolinensis* . Schilder (1965) hypothesized the evolutionary sequence *S. c. carolinensis* -> (*S. c. floridana, S. hughesi, S. transitoria*) -> *S. problematica* which is in general agreement with Tables 1 and 2.

DISCUSSION

The "problem" specimens are characterized by a constant width aperture and a curved posterior canal, placing them in the same Table 1 category with *S. griffini, S. mulepenensis*, and *S. problematica*. The three "problem" specimens bear the following locality data:

A Florida, Miocene
B Bermont/Caloosahatchee De Soto Shell Pit, De Soto, Florida
C Mid-Caloosahatchee, Arcadia, Florida

The De Soto Shell Pit is located close to Arcadia, in central De Soto County, Florida, therefore it is reasonable to believe that specimens B and C came from the same stratigraphic horizon. The designation of specimen A as being Miocene appears to be erroneous and is assumed to be from a similar horizon. A search of the literature does not reveal any detailed studies of the De Soto Shell Pits or central De Soto County. The nearest areas that have been studied in detail are Shell Creek, 15 miles to the south, and the APAC Pit 30 miles to the west (DuBar, 1962; Lyons, 1992; Missimer, 1992). Both the Shell Creek and APAC sites are characterized by having significant exposures of the Fort Thompson, Caloosahatchee, and Tamiami Formations (DuBar, 1962; Missimer, 1992). The entire southwestern region of Florida is underlaid by the Miocene-Lowest Pliocene Hawthorne Group, which is exposed at the bottom of the APAC Pit (Ketcher, 1992; Scott, 1990). The Tamiami Formation is apparently absent in central Do Soto County (Campbell, 1985). The uppermost member of the Hawthorne Group, the Peace River Formation, is very close to the surface in De Soto County and is overlaid by Plio-Pleistocene deposits (Campbell, 1985). This leads to the conclusion that the De Soto Shell Pits contain Caloosahatchee, Bermont and Fort Thompson strata. On this basis specimens A and B are assumed to be from the Caloosahatchee Formation since there are no records in the literature of *Siphocypraea* occurring above this formation or in the Hawthorne Group in southern Florida. This assumption is supported by the presence of *S. problematica* in the same lot with Specimen B and the observation by Jay Tripp that De Soto Shell Pits contain Bermont and Caloosahatchee strata (personal communication, 1993).

The three "problem" specimens are illustrated in Figure 1 in a dorsal view and Figure 2 in an apertural view. Specimen B is illustrated in Figure 3 in a detailed view of the posterior canal at an angle of 45° from the vertical. For comparison purposes the same views of *S. problematica*, *S. transitoria* (paratype), and *S. trippeana* (topotype) are shown in Figures 4, 5, 6, 7, and 8. Dorsal and apertural views of *S. mulepenensis* and *S. griffini* are shown in Figure 9 (after Petuch, 1991). Dorsal and apertural views of *S. lindae* are shown in Figure 10 (after Petuch, 1992). It is worth noting that the specimen identified as *S. transitoria* in Petuch (1988, pl. 12, figs. 9, 10) appears to differ significantly from the holotype figured in Olsson & Petit, 1964, in that the Petuch specimen has a constant width aperture, the columellar teeth are greater in number and the posterior canal protrudes only slightly. However, it does appear to be similar if not identical with the "problem" specimens.

A comparison of the figured species reveals that the "problem" specimens are most closely comparable with *Siphocypraea problematica, S.*

Table 1. Stratigraphy and *Siphocypraea* Ranges

Formation	Epoch	*Siphocypraea* Present
Fort Thompson Formation (South Florida)	Upper Pleistocene	none
Bermont Formation (South Florida)	Middle Pleistocene	none
Caloosahatchee Formation (South Florida)	Upper Pliocene-Lower Pleistocene	*S. griffini* *S. mulepenensis* *S. problematica*
Tamiami Formation "Pinecrest Beds"/ Buckingham Formation (South Florida)	Upper Pliocene	*S. c. floridana* *S. hertweckorum* *S. hughesi* *S. lindae* *S. transitoria* *S. trippeana*
Duplin Formation (North & South Carolina)	Upper Lower Pliocene	*S. c. carolinensis*
Yorktown Formation (North Carolina)	Upper Lower Pliocene	*S. c. carolinensis* *S. pilsbryi*
Jackson Bluff Formation (North Florida)	Upper Lower Pliocene	*S. c. carolinensis*
Chipola Formation (North Florida)	Lower Miocene	*S. chilona*

Table 2. Categories of *Siphocypraea s. s.* Species Based on Two Shell Characteristics

	Aperture with width constant	Aperture wider at anterior
Straight shallow posterior canal	*S. lindae*	*S. c. carolinensis* *S. chilona* *S. pilsbryi*
Straight deep posterior canal	*S. hertweckorum* *S. hughesi* *S. trippeana*	*S. c. carolinensis* *S. c. floridana*
Curved posterior canal	*S. griffini* *S. mulepenensis* *S. problematica*	*S. transitoria*

Figure 1. "Problem" specimens A, B, C (l to r), dorsal view

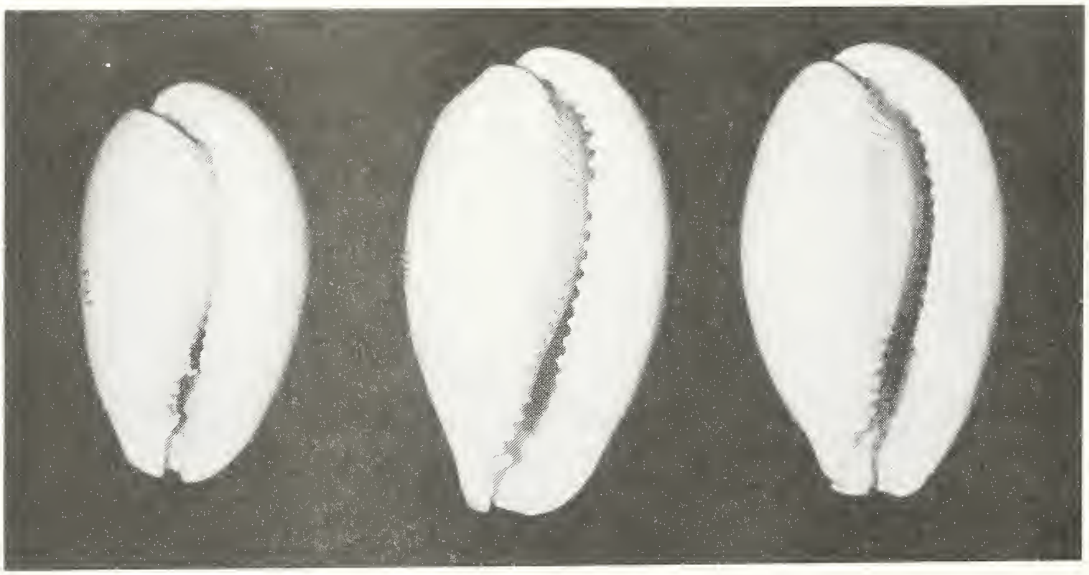
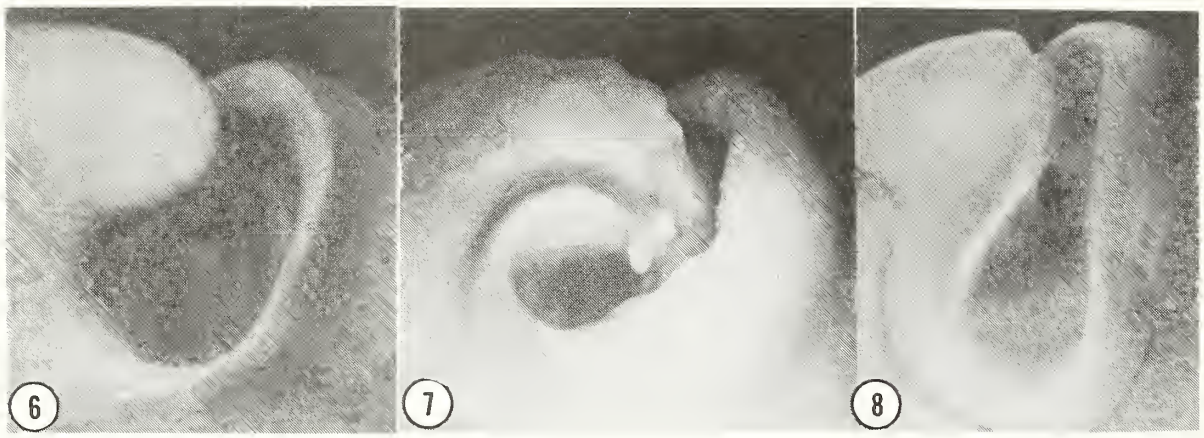


Figure 2. "Problem" specimens A, B, C (l to r), apertural view

Figure 3. "Problem" specimen B, dorso-posterior view.

Figure 4. *Siphocypraea transitoria* (Paratype, 80.6 mm, Brighton facies Pinecrest Beds, Tamiami Formation), *S. problematica* (69.5 mm, De Soto Shell Pit, Caloosahatchee Formation), *S. trippeana* (topotype, 57.7 mm, APAC Pit, Pinecrest Beds, Tamiami Formation), (l to r), dorsal view.

Figure 5. *S. transitoria, S. problematica, S. trippeana* (same specimens as Figure 4), apertural view.



Figures 6-8. Dorso-posterior views of specimens in Figures 4 & 5. (6) *S. transitoria*, (7) *S. problematica*, (8) *S. trippeana*.

transitoria and *S. trippeana*, due to similarities in overall shape, size, aperture form and posterior canal form. *S. griffini* and *S. mulepenensis* appear to be quite different due to their broad inflated form. *S. lindae* differs significantly due to its very coarse prominent teeth and much smaller size (30 mm). Table 3 lists a feature comparison of *S. problematica, S. transitoria* and *S. trippeana* with the three "problem" specimens. The entries in the table were compiled from specimens in the author's collection (*S. problematica* 4 specimens, *S. transitoria* 3 specimens including 2 paratypes) except for *S. trippeana*, which was compiled from two topotypes loaned by Jay J. Tripp. The reduced tooth counts were calculated using the formula of Schilder & Schilder (1938). In the posterior and dorsal views there are close resemblances between *S. transitoria* and the "problem" specimens, with the main differences being in the extent of canal protrusion on the labial side and the degree of coiling. *S. problematica* is quite different in this aspect with the coiling much tighter, bounded by ridges and not protruding. *S. trippeana* is also quite different in that the posterior canal is straight, without any coiling, very protruding, and distinctively pinched. In the apertural view there is a close resemblance between the "problem" specimens and *S. problematica* in terms of apertural width and all aspects of the teeth. *S. transitoria* differs from the "problem" specimens both in width of aperture at the anterior and all aspects of the teeth. *S. trippeana* differs markedly from the "problem" specimens in terms of the very strong teeth on the labial side and the smaller number of teeth.

This leads to the conclusion that the "problem" specimens are more closely related to *S. problematica* and *S. transitoria* than to any other described *Siphocypraea* species. However, in *S. problematica* the degree of posterior canal coiling is greater and the degree of posterior canal protrusion is less than in the "problem" specimens. A comparison with all illustrations and specimens of *S. problematica* available to this author confirms the consistent differences in the posterior canal. *S. transitoria* differs most significantly in form of the aperture. A preliminary cladistic analysis implies that the "problem" specimens are more closely related to *S. transitoria* than to *S. problematica* and may represent an intermediate evolutionary stage or intergrade between the stratigraphically lower *S. transitoria* and the apparently sympatric *S. problematica*. An alternative hypothesis, also suggested by the preliminary cladistic analysis, is that the "problem" specimens are a terminal form in the *S. transitoria* lineage and are not closely related to the *S. problematica* group (*i.e.*, *S. problematica, S. griffini, S. mulepenensis*). The latter hypothesis would extend the stratigraphic range of *S. transitoria* upward into the Caloosahatchee, where it has not been reliably reported previously.

Whether these differences are sufficient to justify description as a distinct species or subspecies will not be clear until further specimens, with accurate stratigraphic data, are available for study. A more

detailed cladistic analysis of *Siphocypraea* (in preparation) may also clarify the relationships.

CONCLUSIONS

A possible new stratigraphic form of *Siphocypraea* is illustrated and compared with previously described *Siphocypraea* species. Though closely related to *S. problematica* and *S. transitoria* this possible new form appears to be distinct and may represent an intermediate stage in the evolution between the two species or a terminal form of *S. transitoria* occurring in a higher strata than previously reported in the literature.

Figure 9. *S. mulepenensis* (64 mm, Griffin Brothers Quarry, Caloosahatchee Formation), *S. griffini* (45 mm, Mule Pen Quarry, Caloosahatchee Formation), dorsal and apertural views (after Petuch, 1991).

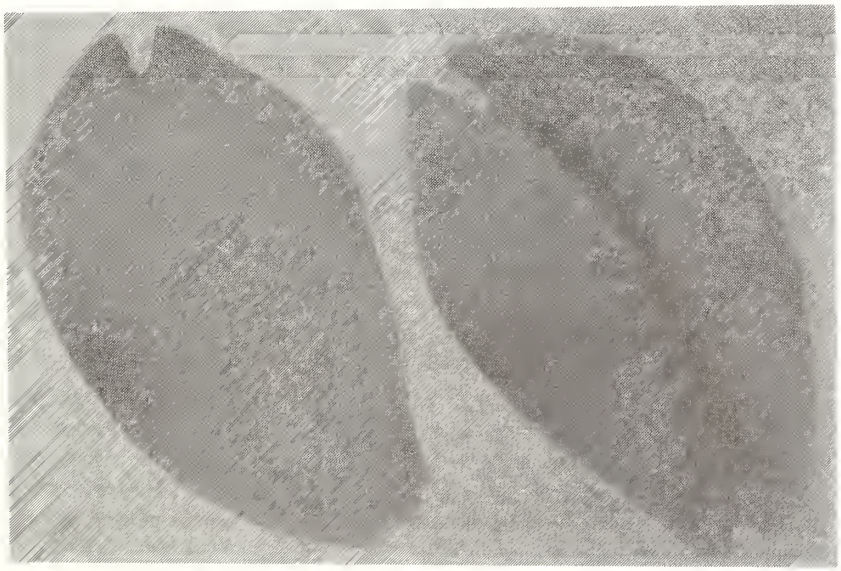


Figure 10. *S. lindae* (30 mm, (Bird Road, Miami Reef Tract, Pinecrest Beds, Tamiami Formation), dorsal and apertural views (after Petuch, 1992).

Table 3. Comparison of "Problem" Specimens with *S. transitoria* Olsson & Petit, 1964, *S. trippeana*, Parodiz, 1988, and *S. problematica* Heilprin, 1886

	S. transitoria Olsson & Petit, 1964	"Problem" specimens	*S. trippeana* Parodiz, 1988	*S. problematica* Heilprin, 1886
Length	67.5 69.8 80.6	56.9 66.7 64.6	57.7 56.2	65.3 59.4 69.5 54.4
Width	42.5 42.1 47.1	32.8 37.6 38.0	30.6 29.7	35.8 32.6 37.4 31.4
Height	32.6 32.5 35.6	26.9 31.7 31.7	26.6 25.3	29.0 28.0 31.8 25.7
Reduced Labial Teeth	16 16 16	21 17 20	17 17	19 20 18 21
Reduced Columellar Teeth	15 14 15	21 18 20	15 14	23 20 18 19
Form of Labial Teeth	Medium length, coarse	Short confined to lip	Long, coarse crossing 1/2 of base	Short confined to lip
Form of Columellar Teeth	Medium length, coarse	Short confined to aperture	Long, coarse crossing part of base	Sharp confined to aperture
Posterior Canal (rear view)	Coiled, smooth	Coiled, smooth	Straight	Tightly coiled bounded by ridges
Posterior Canal Labial Side (top view)	Protruding forming a prominent hook	Slightly protruding	Protruding forming a prominent beak	Very slightly protruding surrounded by ridge
Posterior Canal Columellar Side (top View)	Protruding sharp edge	Slightly protruding rounded edge	Strongly protruding sharp edge	Protruding rounded edge
Aperture	Strongly curved, very wide at anterior, broad V	Strongly curved, narrow at anterior, medium V	Strongly curved, narrow throughout, medium V	Curved, narrow throughout, narrow V

ACKNOWLEDGMENTS

My thanks to Mr. Richard E. Petit for providing paratypes of *Siphocypraea transitoria* as well as a reprint of Olsson & Petit, 1964, Mr. Lindsey T. Groves of the Los Angeles County Museum for suggesting the comparison with *S. trippeana* and providing a copy of Parodiz, 1988, Ms. Jay J. Tripp for the loan of *S. trippeana* and stratigraphic information on the De Soto Shell Pits, and an anonymous reviewer for suggesting inclusion of the stratigraphic and geographic distribution information. The literature search and analysis required to compile the stratigraphic data was both enlightening and frustrating, but contributed materially to improving this paper.

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KELLIA SUBORBICULARIS (MONTAGU, 1803) AN UNUSUAL AND INTERESTING HABITAT

LARRY BUCK

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On November 27th, 1993 Larry Catarius, Bob Pike, Walt Baird and I drove to Santa Barbara for the day to dive. While there I collected some *Euvola diegensis* (Dall, 1898), formerly called *Pecten diegensis*, at 65 to 75 feet on a silty mud and rock bottom. On returning home I opened a dead-collected specimen to clean the mud from inside, and to my surprise I found 24 small bivalves, *Kellia suborbicularis* (also known as *Kellia laperousii* Deshayes, 1839), living inside the pecten. The *K. suborbicularis* ranged from 5 to 12 mm in length and were a translucent white color. I found it hard to believe that enough water and nutrients could enter the dead shell to sustain them. Later at the same spot, I found three dead *K. suborbicularis* in another mud-filled pecten shell. I noticed a small gape in the scallop valves near which the *Kellia* were living. Several others were in a void inside some crumbly bryozoan growth attached to another dead *Euvola diegensis*. Twenty-four of these little bivalves have been deposited in the Santa Barbara Natural History Museum (SBMNH 141666).

We find many interesting things such as this while poking around on our dives. It seems that every dive presents some new information pertaining to habitat and behavior.

Thanks to Jules Hertz and Paul Scott for help in identifying the *K. suborbicularis*.

BOOK NEWS

Australian Marine Shells. Prosobranch Gastropods. Part One
By: Barry Wilson
Published by: Odyssey Publishing. 1993
Price: Vol. 1, $85; Vols. 1 & 2, $160. plus shipping

This book is the first of two beautifully illustrated volumes depicting the rich diversity of marine snails inhabiting the shores of Australia. It represents the first compendium of australian marine mollusks since Joyce Allan's **Australian Shells**, published some thirty-four years earlier.

The book begins with an introduction that contains valuable information for the beginning beachcomber or seasoned malacologist. There are well written sections dealing with shell collecting, remarks about molluscs, classification and nomenclature. The section on collecting provides hints on where to find mollusks and how to prepare them for a collection. These are explained within the responsible context of conservation. The author describes the ethic required to responsibly study mollusks, while minimizing the adverse environmental impacts of that endeavor. For example, Wilson states that species with direct development rather than planktonic larval stages are more susceptible to local extinction from over collection. Shell collectors are discouraged from turning stones and breaking coral or from greedy collecting. Several golden rules for responsible collecting are words that all students of malacology should follow.

The sections on classification and nomenclature explain many of the principles that taxonomists use to organize groups of organisms into units that reflect evolutionary relationships. Classification should reflect relative proximity of organisms to related forms. It is noteworthy that the author states that genera and all other higher categories above the level of species are relatively arbitrary. This is a poorly understood concept that even many professional taxonomists have yet to grasp.

Gastropod systematics is presently undergoing a major revolution in changing the higher groups of snails into a new classification system that is more reflective of evolutionary relationships. This is of little comfort to many people who struggled to learn about prosobranchs, opisthobranchs, pulmonates, archaeogastropods, mesogastropods and neogastropods. Change does not come easy. Barry Wilson does a fine job of incorporating many of the changes that are underway into the organization of taxa within the volume. He introduces terms that may be new to many readers, such as Heterobranchia (a group that includes several families of what used to be mesogastropods together with opisthobranchs and pulmonates). Archaeogastropoda no longer includes many of the groups formerly included within it (such as Patelloidea). Wilson's archaeogastropods are what most other workers are now calling Vetigastropoda (fissurellids, haliotids, trochoideans, etc.). Caenogastropoda now includes some of the old Mesogastropoda together with the Neogastropoda. While these changes may seem disruptive and unsettling, they are reflective of a more objective and logical way of dealing with relationships and the current changes will probably endure for many generations without major additional disruption. One other thing that Wilson does not state is that Prosobranchia is no longer a valid group of gastropods. The things we call prosobranchs have no unique features that they share. In other words, they are united only by things that they lack, not by things that they possess. This is true of invertebrates, as well. The only feature they share is not having a backbone. Haliotidae, Caenogastropoda, Heterobranchia, Cypraeidae, *Conus* are all names for groups whose members all share new innovations. These are the names that will endure.

The bulk of the book presents the diversity of several major groups of the Australian marine gastropod fauna. The author states that there are probably about 10,000 marine australian mollusks. The first volume includes approximately 1,000 species. Major feature of families are described in detail and several important references to those groups are provided for those who wish to investigate in more detail. Characteristics of each genus are described and the type species is listed. Species descriptions include distinguishing features, geographical information of the distribution within Australian waters and beyond and ecological information. Most species are exquisitely illustrated, using the superb drawings of Carina

Wilson or the 44 full color plates of photographs by Patrick Baker. The color plates illustrate more than 800 species. Groups that are well known, such as the cowries, are treated comprehensively with all species being discussed and illustrated. The endemic cowries in the subgenera *Zoila* and *Umbilia* are presented in detail to reflect the extreme variation of direct-developing, geographically separated populations. Other groups, such as the Vitrinellidae, that are poorly known are treated only superficially.

This book provides a wealth of valuable information. It is not just a book for Australians. It will make an important addition to the library of anyone interested in mollusks, from beginner to professional. This book is virtually free of errors. I only found one in my perusal of the work. *Chelynotus* Bergh, 1853, is listed as a genus of Lamellariidae. *Coriocella* Blainville, 1824, is an older name. This book is extremely well presented and is beautifully designed. The superb drawings of living animals, together with some of Barry Wilson's photos of live mollusks, serve as a continual reminder that mollusks are exciting, beautiful, living creatures, not just pretty shells. This book is so attractive that many of us will have to buy new coffee tables to do it justice.

Terrence M. Gosliner
California Academy of Sciences

ANNOUNCEMENT OF THREE ANNUAL MEETINGS

American Malacological Union, 60th Annual Meeting

The 60th annual meeting of the AMU will be held in Houston, Texas from July 9-14, 1994 at the Hyatt Regency in the downtown area. The call for papers has been sent out and the deadline for receipt of abstracts is May 1, 1994.

There will be a Gulf of Mexico Symposium, Unionid Workshop, contributed papers and poster sessions. In addition to the Bourse there will be evening social events: President's reception [Texas Ranch & Barbecue], Museum Fiesta Dinner, auction, and Conch's Country Caper as well as field trips.

For further information and registration forms, contact President Constance E. Boone, Houston Museum of Natural Science, 1 Hermann Circle Drive, Houston TX 77030. Phone: (713) 639-4677; Fax: (713) 523-4125.

Conchologists of America, 22nd Annual Convention

The 22nd annual convention of the COA will be held in Corpus Christi, Texas from July 18-22, 1994 at the Marriott Bayfront Hotel on Corpus Christi Bay.

In addition to programs there will be a bourse, auction, optional trips, fiesta and barbecue. The meeting is hosted by the Coastal Bend Shell Club in conjunction with other Texas shell clubs.

For further information, contact Auction Chairman Dave Green, 12307 Laneview Drive, Houston, TX 77070. Phone: (713) 376-5630.

Western Society of Malacologists, 27th Annual Meeting

The 27th annual meeting of the WSM will be held in Santa Barbara, California from June 26-30, 1994 at the Miramar Hotel located directly on the beach in Santa Barbara.

Highlights of the meeting include two symposia planned during the formal meeting featuring studies of molluscan biogeography and micromollusks, the presidential reception at the Sea Center of the Santa Barbara Museum of Natural History, traditional auction, closing reception and banquet to be held at the main museum. Call for papers and specific meeting information will be sent later.

For further information, contact Treasurer Dr. Henry W. Chaney, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, CA 93105. Phone: (805) 682-4711, x334; Fax: (805) 569-3170.

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THE FESTIVUS

A publication of the San Diego Shell Club

Volume: XXVI April 14, 1994 Number: 4

MEMBERSHIP AND SUBSCRIPTION
Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

COME TO THE AUCTION/POTLUCK!
Saturday evening, April 16, 1994
6:00-11:00 p.m.
For details, see page 42 and map on last page.
(There will be no regular meeting this month.)

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - March 17, 1994

At 7:40 p.m. the meeting was called to order by President Hugh Bradner. Minutes of the February meeting were approved as published in **The Festivus.**

There were several announcements during the business portion of the meeting. Carole Hertz called on all members to donate shells for the upcoming auction on April 16th. Librarian Margaret Mulliner announced that the new **Australian Marine Shells** by Barry Wilson was now available to members. Hugh Bradner announced the dates for the upcoming club events: Bizarre Bazaar on May 14th; September party on September 24th and the Christmas party on December 3rd.

Debbie Catarius and Margaret Mulliner won the door prizes and Larry Buck and Tom Knapik supplied the cookies for the social time at the end of the meeting.

Larry Buck introduced the speaker, Don Shasky, who gave a wonderful slide presentation of his trip to Sarawak and Sabah on the island of Borneo. We were treated to all the sights of the islands including their open-air markets, varied people, temples, flowers, and side trips to see a sea turtle hatchery and orangutan sanctuary.

Don finished the program with slides of the many wonderful species that he has collected by shaking out coral and rocks into a dive bag. He demonstrated this with a display of the equipment he uses. All of those attending were very appreciative of this fine program.

After the program, the members enjoyed cookies and chatting about their favorite subject, shells.

Rick Negus

Come to the Club's Annual Auction/Potluck

The Club's annual Auction/Potluck will be held this Saturday evening, April 16th, from 6-11 p.m. in the community room of Wes Farmer's condo at 3591 Ruffin Rd., San Diego, CA 92123 [See map on last page of this issue.]

It's still not too late to plan to come to this fantastic party. If you have not been contacted, or are suddenly able to attend, contact Carole Hertz (619) 277-6259 or Larry Buck (619) 792-5404. We'll be happy to have you join the festivities.

For those attending, please remember to bring your potluck contribution to serve 12 along with serving utensils and your own eating utensils. Attitude adjustment hour will be from 6-7 p.m., and dinner will begin at 7 p.m. The auction will begin promptly at 8 p.m.

If you have not yet made a shell donation and would like to, contact Carole Hertz. The Club is always happy to have your donation.

See you at the party!!

Come to the Bizarre Bazaar

The fifth annual Bizarre Bazaar (shell bazaar) will be held in the garden of Margaret and Dave Mulliner's home at 5283 Vickie Drive, San Diego (in the Pacific Beach area) on Saturday afternoon, May 14th.

This is a "fun" occasion for members and guests to bring their shells and shell related items to exchange, sell or just show off. Members must bring their own tables or stands for setup and then just enjoy the interaction with old friends and new. For further information, contact Margaret Mulliner (619) 488-2701 or Larry Buck (619) 792-5404.

El Golfo de Santa Clara

A group of Club members and friends are planning a visit to El Golfo de Santa Clara in the northern Gulf of California for the low tides at the end of April. The lowest tides are from Sunday, April 24th to Wednesday the 27th (see January issue of The Festivus, p. 16). There are few facilities in the area and most will be camping. For further information, contact Larry Buck (792-5404).

(continued on page 50)

CONUS TESSULATUS IN THE SEA OF CORTEZ

JOHN JACKSON

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In July 1992, I had the good fortune to participate in a diving trip to the Gulf of California (also known as the Sea of Cortez). Our "Sea of Cortez Odyssey--1992" was a trip by boat from La Paz, Baja California Sur to several islands in the Gulf, including Isla San Francisco, Isla San José, Isla San Ildefonso, Isla San Marcos and Isla San Pedro Martír. Two different stops at Isla Cayo, a small islet off the southern end of Isla San José, resulted in the collection of several specimens of the unusual and beautiful form of *Conus tessulatus* Born, 1778, that is found in the Sea of Cortez. This form has a moderately heavy shell which is broad at the shoulder and has a pattern on the entire body whorl of small rectangular blocks which vary in color from light orange to dark reddish-brown (Color plate 1, figures 1-3). The variations in color pattern of specimens found in the Sea of Cortez represent the entire range of color that is found in this species across the Indo-Pacific.

Isla Cayo (24°53'N, 110°37'W) is 2 km off the southwest corner of Isla San José (Figure 1) and is 90 km north of La Paz. It is small and narrow, consisting of a rocky ridge 400 m in length and 90 m in width at its widest point. The islet ranges in height to 15 m at its southern end, to 4 m at its northern end and has a break near the middle, over which the sea washes at high tide (Lewis & Ebeling, 1974). Its rocky profile drops rapidly into the water to meet a gently-sloping sand bottom. The sand bottom starts at a depth of 15 m off the south end and 6 m off the north end.

On the first day of our voyage, we stopped off the southeast corner of Isla Cayo. We anchored in 20 m and entered the water off the back of our boat. Most of the divers in our party of six worked their way into the shallower water near the rocky shoreline. However, one diver, Larry Buck of Del Mar, California, spent most of his dive in 15 to 20 m depth over the sandy bottom with scattered rubble. Larry found a dark, reddish-brown specimen of *Conus tessulatus* crawling on the sand. His specimen measures 46.5 mm in length and 29.0 mm in width (Color plate 1, figure 1).

Ten days later, we returned to dive Isla Cayo. This time we anchored in 15 m about midway down the west side of the islet. It was 9 p.m. and fully dark when we dove. Three more specimens of *C. tessulatus* were collected from 10 to 15 m depth, all crawling on the the sand bottom. Two of these specimens are pictured. The darker, reddish orange-brown shell (Color plate 1, figure 3) measures 47.7 mm in length and 30.8 mm in width. It has an unusual and very beautiful pattern of very fine rectangular blocks of different sizes and tones. The lighter, reddish-orange specimen (Color plate 1, figure 2) measures 45.9 mm in length and 28.4 mm in width and also has a pattern of fine rectangular blocks.

In July 1993, David Mulliner of San Diego, California and Kirstie Kaiser of Park City, Utah each collected a specimen of *C. tessulatus* off Isla Cerralvo, located south of La Paz in the Sea of Cortez. Both of these speicmens were similar in size and shape to the specimens found off Isla Cayo. They were light in color and had the same pattern of small rectangular blocks (personal communication).

Keen (1971) reported that *C. tessulatus* is a "widespread tropical species" that is "one of the few Indo-Pacific immigrants that have found their way to the West American mainland," and that its "range on the Pacific coast is on the west Mexican coast, especially the offshore islands...." Walls (1979) reported that *C. tessulatus*, though it is found in the Panamic area, is "rare on the offshore islands and mainland of Mexico." In her 1992 **Additions to the Panamic Province Gastropod (Mollusca) Literature**, Carol Skoglund listed other sources which have extended the distribution north from the southern Mexican offshore islands to Cabo Pulmo and La Paz, Baja California Sur, to off

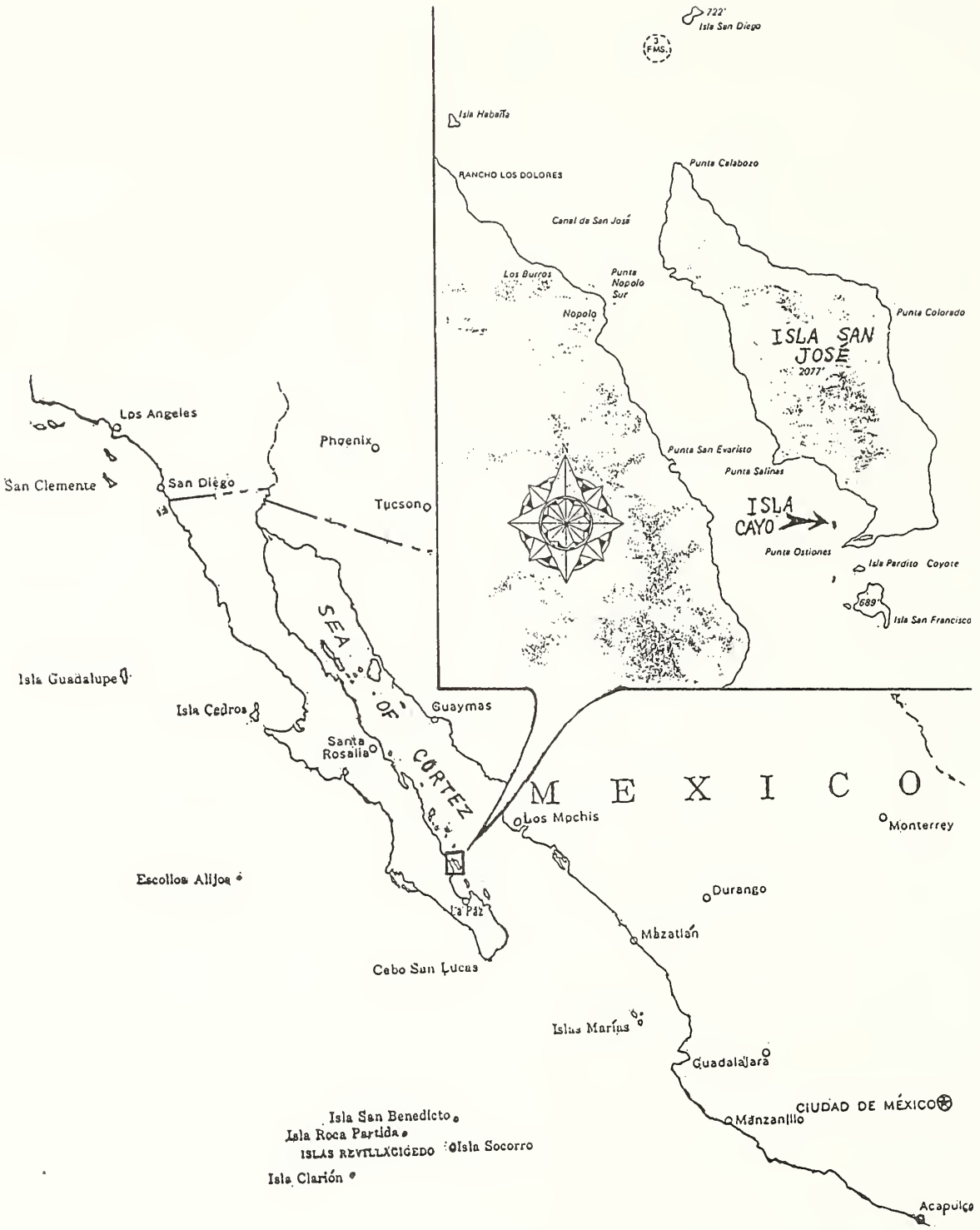

Figure 1. Map showing the Sea of Cortez and the Baja peninsula with a detail of the area surrounding Isla Cayo.

Guaymas, Sonora on the Mexican mainland; to Isla Clarión, Islas Revillagigedo, Mexico; and south to Isla del Coco, Costa Rica; the Islas Galápagos, Ecuador and Panamá. The locations of the specimens covered by this article would seem to extend the distribution even further north (by another 90 km north of La Paz) on the Baja California peninsula side of the Sea of Cortez.

My thanks to Larry Buck for the loan of his specimen for use in this article.

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OLIVA INCRASSATA [LIGHTFOOT, 1786], AN UNUSUAL FORM FROM EL GOLFO DE SANTA CLARA, SONORA, MEXICO

CHARLES WATERS

308 S. Guadalupe Avenue, Redondo Beach, California 90277

For years I had wondered what shell collecting would be like at El Golfo de Santa Clara, that little place I had always noticed on my Auto Club map of Baja.

Well, last June I finally got the opportunity to find out when Larry Buck, Kim Hutsell and I drove down to that quiet little town in the upper reaches of the Sea of Cortez. We went for two mornings and nights of really good minus low tides.

We found El Golfo to be a clean and charming little town with all the necessities: gas, ice, restaurants, a market, R.V. park, etc. I like to think it must be what San Felipe was like many years and many tourists ago. In the time we were there, we had lots of fun and collected many species of mollusks. One remarkable thing that we noticed was that many of the *Oliva incrassata* had unusual striped patterns.

On our last morning of collecting we drove Jubilee, my four wheel drive truck, ten miles south of town on the beach for some collecting in a remote area. Well, with what Larry likes to call "the luck of the Irish," I happened upon the beauty shown in Color plate 1, figures 7 and 8. We all agreed that it was the most remarkable *O. incrassata* any of us had ever seen. The shell is 64.70 mm long and 35.04 mm wide at the shoulder.

Needless to say, we are all looking forward to our next visit to the sleepy little town of El Golfo de Santa Clara, and I am especially looking forward to more of "the luck of the Irish"!

I thank Dave Mulliner for photographing this shell and Larry Buck for his generous input.

BOOK NEWS

A Guide to Worldwide Cowries
By: Felix Lorenz Jr. & Alex Hubert. December 1993
571 pages, 124 plates, 50 figures + numerous unnumbered figures

At first glance this massive volume appears to be another picture book of the cowry shell (a la Burgess, 1970 and 1985, Taylor & Walls, 1975, and Walls, 1979). However, **A Guide to Worldwide Cowries** will not only succeed these volumes but will become the cowry reference book for many years to come. Not only do the authors comment on all living species, subspecies, and forms, they also treat numerous fossil species from the Cretaceous through the Pleistocene. Lorenz & Hubert utilize the Schilderian taxonomic classification for the Cypraeidae and update it as well. Not since Allan's (1956) **Australian Shells** has this scheme been used in a complete family review in an illustrated volume (Allan was greatly influenced by the taxonomic classifications of Iredale as well). The authors base their subfamilial and generic definitions on shell and animal characteristics and inferred evolutionary relationships of the genera and species.

Following brief paragraphs by both authors in the preface, an introduction and overview explains the intent of the volume to be "a guide to taxa and an aid for collectors and scientists to identify species by their shells." However, in some instances the authors refer to animal characteristics for identification as well (*e.g.* the *Blasicrura teres* complex). A short descriptive section on internal and external features of the cowry animal treats the shell, mantle, foot, siphon, radula and shell growth. The authors briefly comment on the fossil history of the Cypraeidae and include a "hypothetical family tree of cowries" based on systematic positions of fossil and Recent genera.

The text is organized as a "checklist" that treats four subfamilies, 35 genera, 207 species, 110 subspecies, and 80 forms recognized by the authors. For each species and subspecies the common name, original reference, synonyms, geographic range, characterization, size range, habitat, cross references to other works, and discussion are included. Distribution maps are included for each species and subspecies as well. All species, subspecies, and forms recognized by the authors are illustrated along with numerous juveniles, hybrids, freaks, subfossils, and "niger forms." Several plates feature living animals as well as selected fossil species.

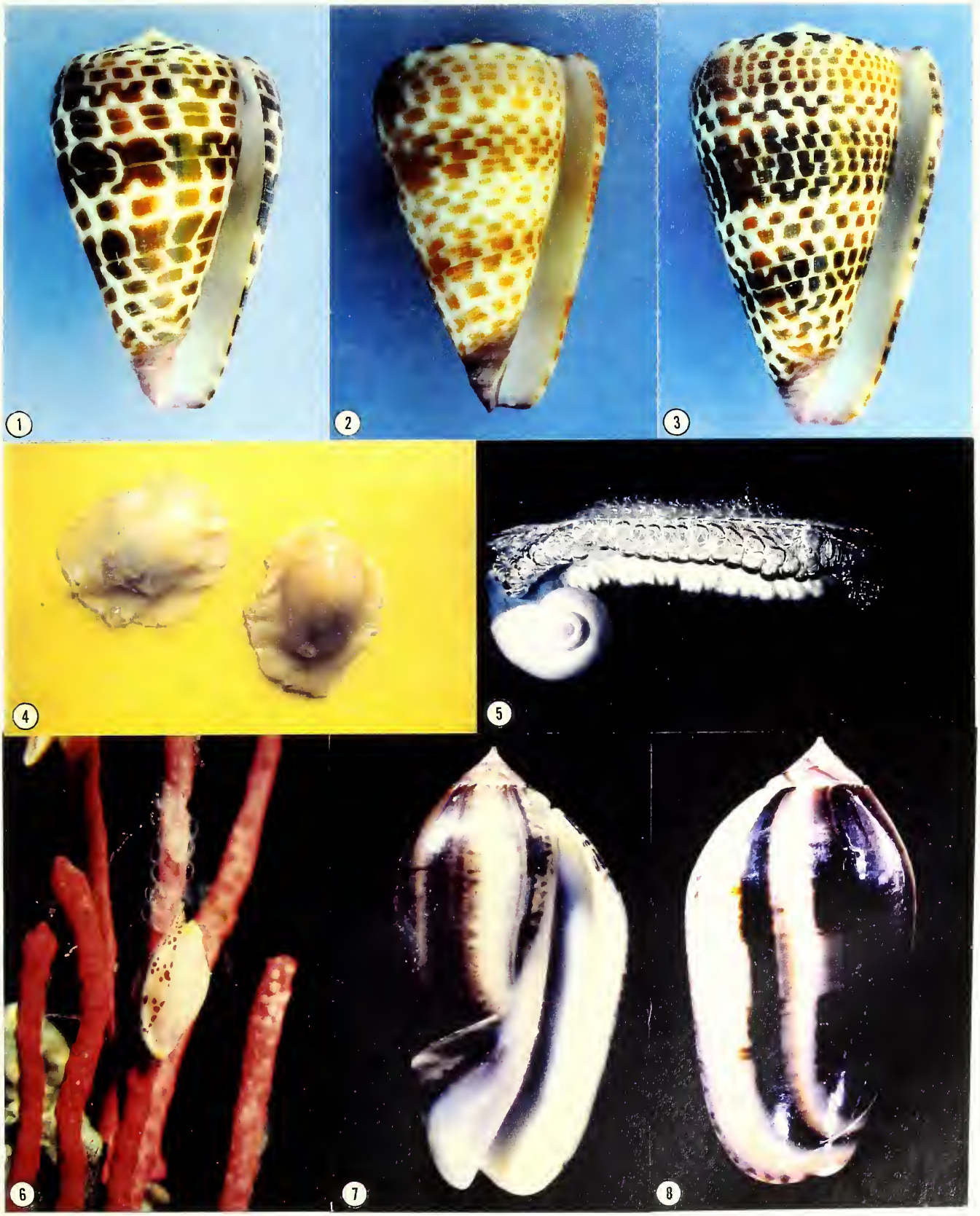
A very useful illustrated key to living genera and species is included as is a multilingual glossary of frequently used terms in English, German, French, and Italian. Finally, an appendix includes "A new subspecies of *Cypraeovula coronata* Schilder, 1930, with a review of the species" and notes on recent finds including the unusual ovulid *Chimaeria incomparabilis* Briano, 1993, from deep water off Somalia.

The authors have done a splendid job of monographing the living cypraeids. Complex taxa such as the South African *Cypraeovula* species group, and the Indo-Pacific groups of *erronea onyx, Cribrarula*, and *Blasicrura teres* are well treated although much work remains to be done. The only awkward feature of this volume is the placement of the plates following the text. Color illustrations within the text would enhance this beautiful book even more.

The 124 spectacular plates make this volume well worth the cost. Without a doubt this volume should be in the library of all cypraeologists.

Available from the publisher: Verlag Christa Hemmen, Grillparzerstr. 22 D-65187 Wiesbaden Germany [DM 168 + shipping and handling] (= $98.00 as of 17 December 1993), or from Mal de Mer Enterprises, P.O. Box 482, West Hempstead, NY 11552 [$100.00 + $4.00 shipping].

Lindsey T. Groves
Natural History Museum of Los Angeles County



COLOR PLATE I. figures 1-8. (1-3) *Conus tessulatus* Born, 1778, three specimens from off Isla Cayo in the Sea of Cortez. (4) *Platydoris macfarlandi* Hanna, 1951, (CASIZ 089102), 2 specimens trawled in Bahía de Sebastian Viscaíno, Baja California, Mexico, August 1952. (5) *Janthina janthina* (Linnaeus, 1758), laying egg mass, San Carlos, Sonora, Mexico. (6) *Simnia loebbeckeana* (Weinkauff, 1881), laying egg mass, Monterey, California. (7,8) *Oliva incrassata* [Lightfoot, 1786], apertural and dorsal views of specimen from El Golfo de Santa Clara, Sonora, Mexico.

PLATYDORIS MACFARLANDI, HANNA, 1951, FROM BAHIA DE SEBASTIAN VISCAINO, AND ISLA NATIVIDAD, BAJA CALIFORNIA, MEXICO

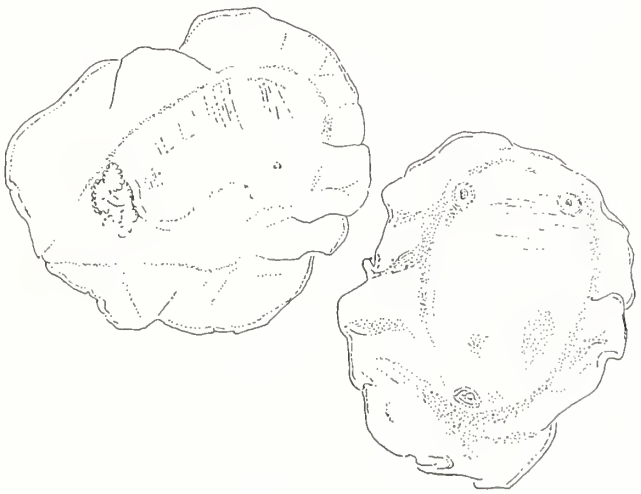
WESLEY M. FARMER
3591 Ruffin Road #226, San Diego, California 92123

In 1951, Hanna described *Platydoris macfarlandi* from three specimens taken off Pismo Beach, California in 129 to 184 meters. Two additional animals were trawled in 55 to 113 meters in Redondo Canyon off Redondo Beach, California and from these two specimens *P. macfarlandi* was redescribed (Behrens & Henderson, 1983). These specimens from deep water were the only five specimens known.

In August 1952, I was a junior scientist on the Scripps Institution of Oceanography research vessel, Paolina-T, working with Senior Scientist Dr. Kenneth Norris. We were looking for fish in Bahía de Sebastian Viscaíno. Nine *P. macfarlandi* were brought up with fish in otter trawls in the bay between August 11 and 13. Three specimens were taken from off Isla Natividad and six more were trawled in the middle of the bay in 88 meters (48 fm). They measured between 14 and 55 mm in length (preserved). A kodachrome transparency of two of the opisthobranchs, photographed in a jar lid, was made aboard ship (Color plate 1, figure 4).

These nine specimens, two of which are shown in Figures 1 and 2, with five microscope preparations and 11 Kodachrome transparencies have been deposited in the Invertebrate Zoology collection of the California Academy of Sciences (CASIZ 089101, 089102 & 089618).

These specimens from Bahía de Sebastían Viscaíno, raise the count of this seldom seen opisthobranch to 14 and are a significant southern distributional record for the species.



Figures 1 and 2. Line illustration of two specimens of *Platydoris macfarlandi* Hanna, 1951, (CASIZ 089102). Trawled in Bahía de Sebastian Viscaíno, Baja California, Mexico, August 1952.

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TWO INTERESTING EGG-LAYING GASTROPODS: *SIMNIA LOEBBECKEANA* AND *JANTHINA JANTHINA*

ALEX KERSTITCH

10700 Calle Vaqueros, Tucson, Arizona 85749

Although most gastropods are bottom dwelling, associated with a wide variety of substrates, *Janthina janthina* (Linnaeus, 1758) (Color plate 1, figure 5) is a pelagic species which spends most of its life floating on the sea surface. Buoyed by a self-constructed platform, or raft of bubbles, it drifts along upside down on the surface at the mercy of winds and currents. The bubble cushion is formed by the extension of the snail's foot where it traps tiny air bubbles from the water with its spoon-like foot. It coats each bubble with a mucilaginous secretion so the raft of bubbles can be held together to support the floating shell.

The bubble float also serves to trap small hydrozoan prey such as *Velella* and *Porpita*. *Janthina* secretes a purple dye when the prey is captured. It is believed the dye keeps the prey's nematocysts from firing while *Janthina* bites off chunks of stinging tentacles with its ptenoglossate radula. Smaller prey can be swallowed whole in its buccal cavity.

Like many gastropods, *Janthina* is hermaphroditic and the eggs are attached to the bubble raft. Some species, however, give birth to free-swimming larvae, or veligers. Being gregarious snails, janthinids are often washed up on beaches in large numbers when heavy inshore winds or storms prevail. Strandings of *Janthina* on shore are sporadic and they are often absent for years. When beached, the delicate shells are usually damaged, but good specimens can be collected near shore before they get washed ashore. In the Gulf of California *Janthina* drifts often include *Physalia utrilculus, Porpita porpita, Velella velella* and the pelagic nudibranch, *Glaucus atlanticus* Foster, 1777. All seem to be intertwined in their predator-prey relationships. All of the five to six janthinid species are blind and without statocysts. The operculum is degenerate and the shell is thin and fragile, rarely exceeding 2 cm in length.

In the Panamic province the family Janthinidae is represented by two genera and at least three species, -- *Janthina janthina*, *Janthina globosa* Swainson, 1822 and *Recluzia palmeri* (Dall, 1871). These have a widespread geographic distribution and (except for the Panamic *Recluzia palmeri*) are circumtropical.

Simnia loebbeckeana (Weinkauff, 1881), (Color plate 1, figure 6) is a relatively common west coast species ranging from Monterey, California south to west Baja California occurring at depths of 60 to over 300 feet with mantle coloration ranging from pure white to crimson red.

Occasionally called rice shells, all *Simnia* species are ovulid cowries which are exclusively associated with gorgonians, sea whips, sea fans, sea pens and even black corals. Feeding on the colorful polyps and tissues of their hosts, their mantle coloration is derived from the tissue pigmentation of the ingested soft parts. A single species feeding on a variety of soft corals may exhibit a range of mantle colorations, each matching the color of the hosts. Although some damage to the host does occur, *Simnia* rarely destroy their host organisms and grazed areas are restored relatively quickly with tissues and polyps. Various mantle coloration in the same species can, at times, make identification difficult.

Eggs of *Simnia* are laid in round, transparent capsules attached directly to branches of the host (Color plate 1, figure 6). In two to three weeks tiny veligers hatch out in search of a host.

Aquarium observations have revealed that male *Simnia* spp. from California and the Gulf of California tend to be territorial. When two or more males are found on a single gorgonian, they

will vigorously defend their territories from intruding males. Females, however, are left alone and a single male may live with a harem of four or more females. Another aquarium observation demonstrated that some *Simnia* spp. occasionally leave their hosts in search of another. By drifting upward towards the surface the minute snail attaches its foot upside down to the surface film of water and drifts about. From time to time the foot is retracted into the shell and the snail sinks to the bottom in search of another host. If a new host is not encountered the snail repeats its ascent to the surface. The whole process of rising to the surface and sinking to the bottom is repeated several times until a new host is encountered.

CLUB NEWS (continued)

Balboa Park, Now a Safer Place

A notice called "Social Security" in the March/April 1994 issue of **Field Notes**, a publication of the San Diego Natural History Museum, announced that there has been a dramatic decrease in crime in Balboa Park as a result of a "beefed-up police force, park rangers, security guards, and border patrol personnel on horseback, bicycles, motorcycles, squad cars and on foot..." and that people should not be insecure about enjoying our museums, theaters and gardens.

A call to Officer Bette Weed at the Balboa Park Storefront office [opposite the Cafe del Rey Moro] (525-8244) confirmed that "crime in the park is way down," with the most dramatic decrease in crimes against persons. Anyone desiring a copy of the crime statistics in Balboa Park can request one by visiting the Storefront Office.

This is, indeed, good news to the many people and organizations such as the San Diego Shell Club that meet in this beautiful park.

Too Late for the Roster

Auckland Institue & Museum, Serials Dept., The Library, Private Bag, Auckland, New Zealand

Woolsey, Mary Jo (Jody), 3717 Bagley Ave., #206, Los Angeles, CA 90034, (213) 839-1604

New Members

Brenner, Ed, 1291 Las Flores Drive, Carlsbad, CA 92008, (619) 720-1556

Boyd, Bob & Susie, P.O. Box 1541, Fallbrook, CA 92088, (619) 728-3849

Price, Ali L. & Kevin Martyn, 31500-1st Ave. So. #22-303, Federal Way, WA 98003, (206) 941-2349

THE FESTIVUS

A publication of the San Diego Shell Club

ISSN 0738-9388

Volume: XXVI | May 12, 1994 | Number: 5

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Collecting Mollusks in the South China Sea

Paul Scott, Associate Curator of Invertebrate Zoology at the Santa Barbara Museum of Natural History, will present a slide program (with a display) on his trip to the South China Sea.

Book and Reprint Sale

Meeting date: May 19, 1994
Shells of the month: bivalves

CONTENTS

CLUB NEWS

The Auction/Potluck

Because the May issue had to go to press early, news of last month's Auction will be published in the June issue. Additionally, that issue will contain a listing of those members and friends who donated auction material.

The 1994 Greater San Diego Science and Engineering Fair

The San Diego Shell Club has again sent its judges to the Science Fair, this year chaired by Hans Bertsch. This is the Club's 23rd year of participation and the judging committee will report to the membership at the May meeting. The Club chooses a winner from the senior division entrants in the area of marine life. The winner will attend a future meeting of the Club and give an overview of the winning project and receive a Club award from a choice of three books, **Between Pacific Tides**, **Intertidal Invertebrates of California** or **Invertebrate Zoology**.

The Bizarre Bazaar

The fifth annual shell bazaar (Bizarre Bazaar) will be held this Saturday, May 14th, beginning at 1 p.m. in the garden of Margaret and Dave Mulliner's home at 5283 Vickie Drive, San Diego, 92109. It's a most enjoyable event so bring your shells or shell related items and a table or stand and enjoy the bazaar. There's heavy admiring, trading, buying and selling--and socializing.

The Festivus Welcomes Articles

The Festivus welcomes your articles, both popular and scientific (sometimes overlapping), long or short -- from collecting and diving trips, aquarium observations, unusual finds, photography of shells, unusual shell and color forms, collecting and/or preparation techniques etc. -- to serious articles on topics such as habitat observations in the field (i.e egg laying, feeding, copulating, niches), studies of molluscan morphology, range extensions, book reviews.

Articles should be submitted to the editor at the Club address (front page) double spaced and including any art work, such as photographs (color or black & white), drawings, tables and maps. In addition to hard copy, accompanying floppy disks in Word Perfect 5.0 are very welcome.

Articles are subject to review by **The Festivus** review board (front page) and this editor. This is done to check accuracy, insure that information is current and suggest improvements. It should not prevent anyone from contributing. The review process only makes the submitted paper better.

Many of those who have published in **The Festivus** have decided that they like the idea. Why not send in an article; you'll probably find it an enjoyable experience also.

The Club Book and Reprint Sales

The Club's book and reprint sales at the past few meetings have been well received and successful. The material at the sales is duplicate library material and/or items donated for the sale. The monies raised from the sales are used for purchases of new books and periodicals for the Club's library. There will be another book and reprint sale at the May meeting. It's first come, first served and payment is on the honor system. So come early and find a bargain.

Club Mugs Available

Club mugs are still available for purchase. These specially designed mugs, each featuring three local shells, are in two sizes: standard size at $7 and extra-large at $9. Should you want the mugs shipped, add $2 domestic postage (per mug). For overseas purchases, postage varies depending on the country. Mugs can be purchased directly at the May meeting.

PANAMIC PUZZLES; A QUESTION OF ASSIGNMENT (*ODOSTOMIA* VS. *TURBONILLA*)

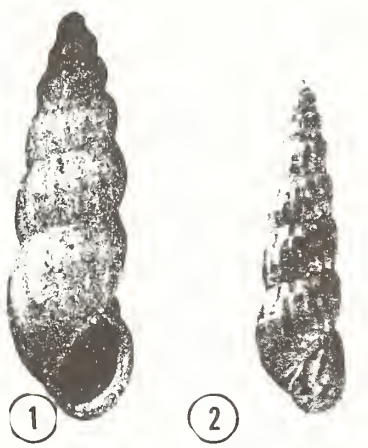
ROBERT KOCH

Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road,
Santa Barbara, California 93105

Within the family Pyramidellidae, as recorded by Keen (1971), the most numerous genera in the Panamic faunal province are *Odostomia* and *Turbonilla*. With the various taxonomic changes that have been published subsequently, as compiled by Skoglund (1992), it is more appropriate to raise these two genera to the subfamily level of Odostomiinae and Turbonillinae. In any event this will not alter the character of this fruitless exercise in taxonomy as no changes are involved.

While the majority of turbonillas exhibit a more slender and tapering profile as opposed to the odostomias, the more pronounced morphological key is supposedly a columellar fold. As described by Dall and Bartsch (1909), Keen (1971) and Abbott (1974), the genus *Odostomia* generally may be separated by an easily recognizable collumellar fold. *Turbonilla*, on the other hand, may often have a weak fold hidden or not readily visible on the columella. So in the initial separation look for the fold. Where evident, commence identification within the odostomias; otherwise start with the turbonillas.

An array of genera and subgenera are represented within the two subfamilies -- some 32 if Keen's count is used. There are a goodly number of identifiable species which appear to fit comfortably within their generic assignments. Occasionally though, the rationale for a given designation fails to penetrate this individual's cranium. In particular, two species under the specific names *herrerae* and *wetmorei* have me confused. Viewing the illustrations and original descriptions of the holotypes (reproduced here as Figures 1 and 2 so that the reader, if so "taxonomically" inclined, can pursue an independent conclusion) the two species seem reasonably similar



Figures 1 & 2. (1) *Odostomia (Pyrgulina) herrerae* Baker, Hanna & Strong, 1928, holotype, after Baker, Hanna & Strong, 1928. (2) *Turbonilla (Pyrgiscus) wetmorei* Strong & Hertlein, 1927, holotype, after Strong & Hertlein, 1927.

in appearance, leaning toward elongate and slender. Each has rounded axial ribs from suture to suture and on the final whorl extending toward the umbilical region. As stated in their respective descriptions, the spiral sculpture of each consists of "incised" lines. The lengths of the holotypes are about the same -- 3.4 mm for *herrerae* versus 3.5 mm for *wetmorei*. The diameter of *herrerae* is broader than *wetmorei* 1.12 mm versus 0.9 mm and by my count (of the holotype illustrations) *herrerae* exhibits 5½ teleoconch whorls, *wetmorei* 6½. The authors described the whorl counts as 5¾ and 7 respectively. In the latter instance, it may be that the apertural whorl was counted as a full whorl rather than a half. There is a color pattern associated with *wetmorei*, but *herrerae* is described as "shining, milk-white" which would indicate a dead shell that may or may not have had a color feature.

Thus far, in my view, the two species might easily be considered related or, if a variability factor were included, possibly conspecific. But the descriptive details do not support this cursory conclusion.

The descriptions of our two micro-monsters were published in the late 1920s and '30s at which time, so far as I can determine, the authors' principal source for comparison would have been the pyramidellid monograph of Dall & Bartsch (1909). So where to place these somewhat similar and minute beauties?

The first to be described was *herrerae*, where the authors indicate, with respect to the aperture, "...peritreme completed by a very narrow parietal callus, the outer and basal lip, columella and parietal wall not being distinctly definable." To me this connotes a whole or continuous apertural margin and the illustration seems to support this conclusion. There is no mention of a columellar fold, hence my presumption that the species falls under Turbonillinae, genus *Turbonilla*. Then, what subgenus? Using the Dall & Bartsch (1909) key, *herrerae* probably belongs in the subgenus *Pyrgiscus* where: "....Axial sculpture consisting of well developed ribs. Spiral markings...of strongly incised lines. Summits of whorls not strongly shouldered...." The illustration certainly gives the impression of "well-developed" ribs. While the description refers to "numerous fine, wavy, incised lines," the illustration shows, on the last whorl, what can be taken for "strongly incised lines." "Summits of whorls not strongly shouldered...." certainly applies as illustrated and described as "...whorls...slopingly shouldered," at least on the later whorls. My specimens vary from strongly to slopingly shouldered, but all adults display a complete peritreme with no visible fold (Figure 3).

So much for *herrerae*; now for *wetmorei*. Here the authors indicate a "...columella raised, curving into the aperture as an oblique fold." My assumption is that this characteristic would probably indicate an odostomian, in this case the genus *Odostomia* -- and that the subgenus might be *Pyrgulina*. Dall & Bartsch (1909) characterize the shells in this subgenus as having "...strong axial ribs which extend from summit to the umbilical area; intercostal spaces of the spire and base marked by fine incised lines...." The description and illustration would appear, in most particulars to support these statements. The description states "...upper whorls strongly shouldered, less so on the later whorls...." This feature also is apparent in the illustration, but from the illustration of *herrerae* the same might apply (Figure 4).

Figures 3 & 4. (3) *Odostomia (Pyrgulina) herrerae*, approx. 3.0 mm L. (Note color band on final whorl.) Dredged 15 m (50 ft) on sand bottom off Isla San Jorge, Gulf of California, 28 September 1973. Leg. R. Koch. (4) *Turbonilla (Pyrgiscus) wetmorei*, approx. 3.5 mm L. Dredged in 91-107 m (300-350 ft) on coarse sand, cobbles and shell debris bottom, SW of Punta Doble, San Carlos (Guaymas), Sonora, Mexico, May 1985. Leg. R. Koch. Photos: D. K. Mulliner.

Here, as with *herrerae*, my shells exhibit a variability factor, but the "oblique fold" is evident. And incidentally, if my identifications are correct (I'm more confident about *herrerae* than *wetmorei)*, the two species have distinguishable nuclei (Figures 5 & 6).

By my reckoning *herrerae* is a *Turbonilla*,

subgenus *Pyrgiscus*, and *wetmorei* an *Odostomia*, subgenus *Pyrgulina* (Figures 3-6).

Well, not hardly! Just the opposite is the case: the two species are *Odostomia (Pyrgulina) herrerae* Baker, Hanna & Strong, 1928, without a columellar fold, and *Turbonilla (Pyrgiscus) wetmorei* Strong & Hertlein, 1937, with a fold. So much for my ability to key-out and identify some of these minute rascals. If there is any consolation in this exercise in futility it comes from Col. George Hanselman. About descriptions, he wrote the following in 1973: "And so, as always, in the long run a description may turn out to be the product of what the describer saw, what he thought he said about it, and what you think he thought he said." Words to guide this poor benighted individual.

Figure 5. *Odostomia (Pyrgulina) herrerae*. Nucleus of specimen illustrated in Figure 3. Photo: D. K. Mulliner.

Figure 6. *Turbonilla (Pyrgiscus) wetmorei*. Nucleus of specimen illustrated in Figure 2. Photo: D. K. Mulliner.

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PERSICULA PULCHELLA (KIENER, 1834) "A NUMBING EXPERIENCE"

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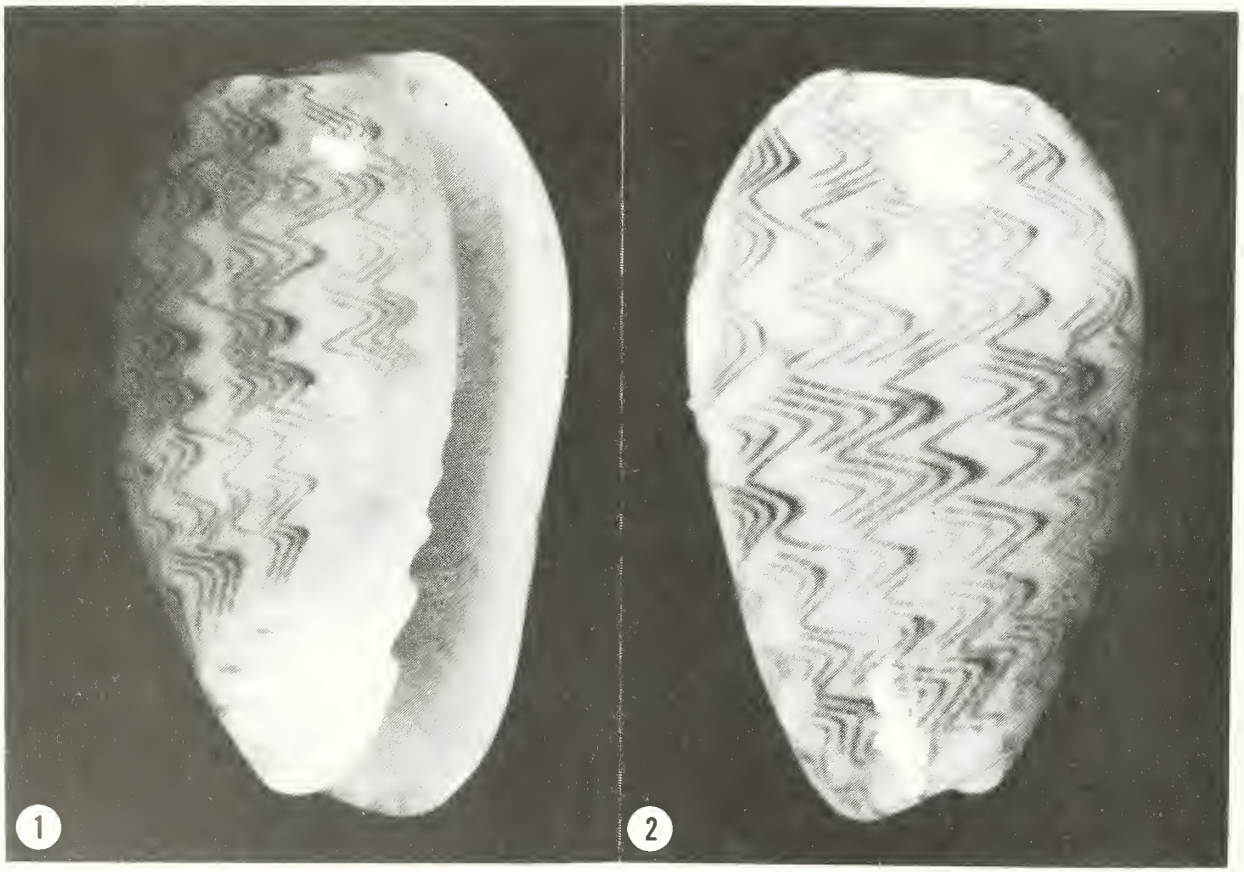
During a dive on the May 1992 expedition at Cocos Island, Costa Rica, I found myself faced with a situation where applying an old collecting technique seemed appropriate. Our dive vessel, **The Undersea Hunter**, had anchored near one of the small islets off Cocos for a night dive. Not wanting to miss the opportunity, I made a dive with video gear in tow. As often happens with underwater photography, an equipment failure occurred early in the dive and I decided to return to the boat to correct the problem.

While en route, I scanned the bottom as I went, hoping to find a specimen or two of *Oliva foxi* (Stingley, 1984). The sand bottom at 20 m (65 ft) was rather barren and I found no olives, or anything else for that matter. That is, not until I spotted a tiny marginella cruising along the sand. I was really surprised that I saw it at all because it was the same buff color as the sand and less than 10 mm in length. (See Figures 1 & 2).



Figures 1 & 2. *Persicula pulchella* (Kiener, 1834), 8.3 mm, live collected on sand at 20 meters (1) apertural view (2) dorsal view. Photos: D. K. Mulliner.

I'd made the dive with video equipment instead of collecting gear so I had no bag, no bottle, no gloves, nothing to carry the specimen. And from past experience, I didnt want to try carrying something that tiny and slick between my fingers back to the boat. Then I remembered a technique I'd used in Okinawa for transporting small cowries safely to the surface. I took my regulator out of my mouth, placed the marginella between my upper lip and gum, and replaced my regulator.

Only about fifteen minutes had elapsed from the time I found the specimen to the time I stood on the deck of the **Undersea Hunter**. But, by then, my entire upper lip, the gums around where I'd carried the marginella and the tip of my tongue were completely numb. It felt similar to visiting the dentist, but there was no taste, foul or otherwise, just numbness that lasted for well over a half hour. This phenomenon may already be known to others, but it was certainly something new to me.

THE SECRET IS OUT: A NEW MOUSETRAP HAS BEEN INVENTED!

HAL & CHARLOTTE NORRID

233 E. Cairo Drive, Tempe, Arizona 85282

Full disclosure has been made. When they go camping together, the Skoglunds never have mice in their camper and the Norrids always do.

In the spring of 1993, Carol and Paul Skoglund found a live *Spondylus leucacantha* Broderip, 1833 (about 110 mm L) and put it on the doorstep to their camper. During the night the bivalve relaxed and opened its valves. Along came an inquisitive mouse. The *Spondylus* responded by quickly closing its valves and the poor little mouse did not get into the house (Figure 1).

No mice in the Skoglund's camper!

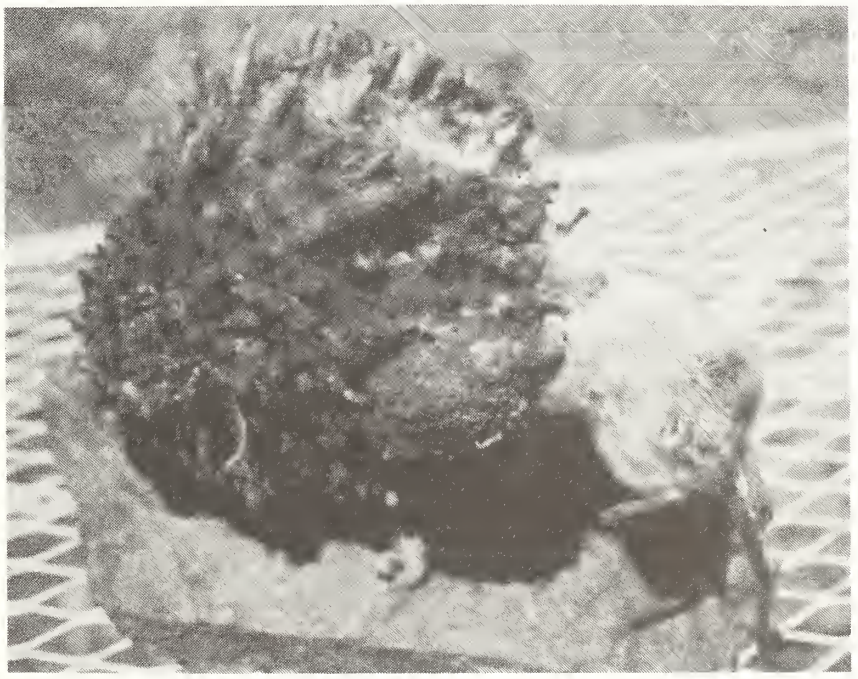


Figure 1. The *Spondylus leucacantha* mousetrap with mouse.

OCTOPUS BITES CLAM

ROLAND C. ANDERSON

The Seattle Aquarium, 1483 Alaskan Way, Seattle, Washington 98101

I have always been interested in unusual shell damage caused by predation or parasitism (see Anderson, 1993). Shell damage can show the evidence of the inter-relationship between animals long after they have died, in the form of their long-lasting shells. This evidence persists even in the fossil record (e.g. Geary *et al.*, 1991).

Recently, I have been studying how octopuses [*Octopus dofleini* (Wulker, 1910)] open clams for eating (Mather & Anderson, in prep.). These octopus may pull the clams apart, chip the edges of the shell or break it with their beaks, or drill into it. They use a radula to drill shells in combination with an accessory boring organ, which helps dissolve shell material (Nixon, 1980). Once they drill a hole or chip the edge of a shell they inject a bit of venom into it to paralyze and kill the clam. In Anderson (1985) I documented the reluctance of an *O. dofleini* to bore into large (8-10 cm) *Humilaria kennerleyi* (Reeve, 1863), presumably because of the extra thickness of the clam's shell. As an addendum to that information, I have since found that octopus will bore more readily into small *Humilaria*, smaller than 8 cm. I recently found damaged *Humilaria* shells in octopus middens ("middens" are the food and shell remains that octopuses leave in front of their dens). I was diving at the Keystone Underwater State Park (Whidbey Island, Washington State). The five octopus dens were under large boulders making up a jetty. The octopuses were not weighed, but I judged them to be 10-15 kg. Midden remains were composed of edible crabs *Cancer magister, C. productus, C. gracilis*, and bivalves *Chlamys hastata, Mytilus trossulus, Saxidomus giganteus, Protothaca staminea, Clinocardium nuttallii, Solen sicarius, Entodesma navicula (= saxicola),* and *Humilaria kennerleyi*. None of the shells were drilled. Shells were either undamaged, broken, or chipped.

It was particularly interesting to me to find chipped *Humilaria* shells (see Figure 1). Sea stars that can open a *Humilaria* shell laboriously delaminate the edges to gain entrance (Anderson, 1985). Hartwick *et al.* (1978) found that *Humilaria* shells in den middens of *O. dofleini* had mostly been drilled or opened undamaged. Evidently, large octopuses can also chip the edges to gain entrance. The force needed to do so must be considerable, as this is a thick-shelled clam. The shell in Figure 1 is 77.2 mm long, 58.6 mm wide, and 3.9 mm thick at the edge where the chipping took place. This gives me a new respect for the power of an octopus beak.

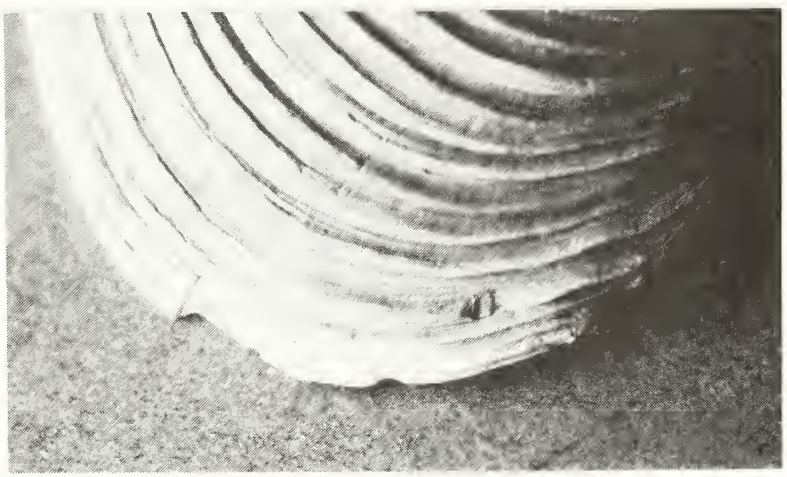


Figure 1. This *Hunilaria* shell was found in an *Octopus dofleini* midden. The octopus bit the edge of the shell with its beak to get inside. Photo: Leo Shaw, Seattle Aquarium.

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THE FESTIVUS

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Volume: XXVI | June 9, 1994 | Number: 6

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Diving in the Philippines

Bob Yin, Club member and an award winning underwater photographer, has just returned from the Philippine Islands. Bob will give a slide presentation on this recent trip.

Assessing Changing Energy Needs vs Predation Risk in [the barnacle] *Pollicipes polymerus*

James Sullivan Gibilisco, a twelfth grader at Mt. Miguel High School, is the Club's 1994 Science Fair winner. He will give an overview of his project and receive his Club book award.

Meeting date: June 16, 1994
Shells of the month: Philippine shells

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - May 19, 1994

At 7:40 p.m. the meeting was called to order by President Hugh Bradner. Minutes of the March meeting were approved as published in **The Festivus**.

Guests and new members were introduced and there were several announcements. Treasurer Margaret Mulliner disclosed that the Club's April auction was the most successful ever. The Club Science Fair winner, James Sullivan Gibilisco - a 12th grader at Mt. Miguel High School, was announced. He will be giving an overview of his winning project and receive his prize at the June meeting. A motion to buy bookcases from the Botanical Garden Foundation was rejected by a voice vote. Jules Hertz reviewed a number of new publications which will be available to members in the Club library. Billee Brown gave a short announcement about the upcoming COA convention in Texas.

Rick Negus won the door prize, and the cookies for the social hour were supplied by Nancy Schneider and Mary Regula.

Jules Hertz introduced the speaker, Paul Scott, who gave a wonderful slide presentation of his trip to Hong Kong and collecting mollusks in the South China Sea. Paul went to Hong Kong to participate in a workshop that aimed to establish a base line for a future marine sanctuary in the area. We were treated to the sights of Hong Kong as well as an overview of the facilities at the workshop and the local marine habitats. All of those attending enjoyed this program very much.

After the program, the members enjoyed the refreshments and talking about their favorite subject, shells.

Rick Negus

The Annual Auction/Potluck

This year's Auction was another rousing success, with at least fifty members and guests attending. All enjoyed a wonderful potluck and Dave Mulliner's famous punch at Wes Farmer's Clubhouse.

The auction was very exciting, with many sensational shells, including a *Cypraea marginata ketyana* bringing spirited bidding and Tony D'Attilio's exquisite drawing of *Homalocantha zamboi*, the most hotly contested item at the auction. Many fine out-of-print books were also auctioned off including a copy of the **Thesaurus Conchyliorum** and Kira & Habe's two volume **Shells of the Western Pacific**.

The food was in great abundance and everyone got more than their fill of everything from salad to curried chicken, with an equal amount of delicious desserts also available.

Carole Hertz did a wonderful job as auctioneer, and with the help of Margaret Mulliner and Pat Boyd, was able to complete the auction in record time. Many other people helped to make this our most successful auction to date. Our grateful thanks first to Wes Farmer for hosting the auction again and to the many Club members who organized the party, bagged the shells, set up and cleaned up after it was over and all of those who participated in the bidding.

Below are the names of those who generously contributed the shells which made the auction possible.

Rick Negus

Donors to the 1994 Annual Auction/Potluck

Paula & George Barton, Billee Brown, Ed & Pat Boyd, Marge & Hugh Bradner, Twila Bratcher, Larry Buck, Larry Catarius, José & Marcus Coltro, Karen Couch, Anthony D'Attilio, Helen DuShane, Wes Farmer, Bob Foster, Tony Gabelish, Dave Green, Carole & Jules Hertz, Michael Hollmann, John Jackson, Kirstie Kaiser, George Kennedy, June King, Kay Klaus, John LaGrange, Marge & Ken Lindahl, Margaret & Dave Mulliner, Rick Negus, Carol Novak, Jeanne & Don Pisor, Dale Robertson, Wally Robertson, Bill & Carol Romer, Don Shasky, Carol & Paul Skoglund--Our grateful appreciation to all of you.

(continued on page 75)

A ZOOGEOGRAPHIC SUMMARY OF THE MARINE MOLLUSKS OF CLIPPERTON ISLAND (TROPICAL EASTERN PACIFIC OCEAN)

William K. Emerson

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INTRODUCTION

Clipperton Island (10°18'N, 109°13'W), a possession of France, is of volcanic origin peaking on the submerged Clipperton Ridge, and rises some 3,000 m above the ocean floor (Menard & Fischer, 1958). This small, oval shaped, coral island, a "near-atoll", is but 12 km in circumference, and most of the island is only 0.65 to 4 m above mean tide level. The most conspicuous feature of the island is Clipperton Rock, on the southeastern end of the island, with an elevation of 29 m (Sachet, 1962a,b). The island encloses a fresh water lagoon, which was open to the sea about 150 years ago (Hertlein & Emerson, 1953, pl. 26; Allison & Holden, 1971).

Located ca. 10° north of the Equator, Clipperton Island is the most isolated of the eastern Pacific oceanic islands (Figure 1). The nearest land is Mexico, some 600 nautical miles to the NNE and the closest coral atoll in the central Pacific is Parkapuka Island in the Tuamotu Archipelago, some 2,300 nautical miles to the southwest (Sachet, 1962a).

Clipperton Island lies in the path of several shifting oceanic current systems (Zinsmeister & Emerson, 1979). In the winter months, the North Equatorial Current flows westward to and beyond the island, whereas the Equatorial Counter Current extends to the north of the island, but this eastward flow may reach the island during interrupted cycles (Sachet, 1962a).

FAUNAL COMPOSITION

A compilation (Appendix 1) of the shallow-water, shelled mollusks reported in the literature and/or based on specimens located in collections from Clipperton Island reveals an impoverished fauna totalling 92 species composed of gastropods (70 species, 76%) and bivalves (22 species, 24%). (Collections of other molluscan groups are not recorded here). The vast majority of the bivalves are epifaunal elements capable of being rafted to this insular outpost. Most of these bivalve groups have post-larval stages that can attach to or bore into floating debris and thus can be transported and dispersed via ocean currents (Emerson, 1978:92). The remainder of the bivalves are infaunal elements presumably with a reproductive mode involving planktotropic larvae that are potentially capable of long-distant dispersal (cf. Le Pennec, 1973). Most of the families of gastropods are known to have some species possessing larvae that can be dispersed as free-living planktonic elements in the water column (Emerson, 1978:92). The influence of El Niño/Southern Oscillation events on the dispersal patterns and survival rates of the mollusks that occur on this island requires further investigation and interpretation (cf. Kay, 1991; Richmond, 1990).

The marine molluscan fauna (Appendix 1) is dominated by provincial elements of the Indo-Pacific (with 40 species; 43%) and the Panamic (with 38 species; 41%). Lesser elements are represented by the Californian-Panamic (with 5

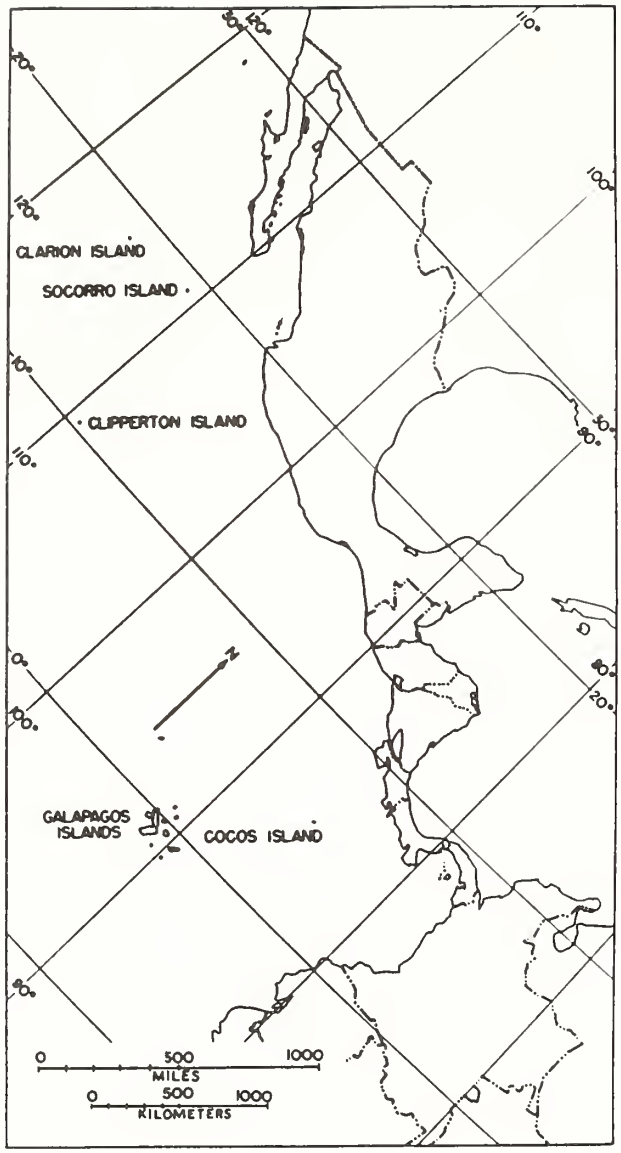

Figure 1. Chart showing the location of Clipperton Island in relation to the other oceanic islands in the eastern Pacific Ocean (after Emerson, 1967).

species; 5%), Endemic (with 3 species; 3%) and the Cosmopolitan-Circumtropical component (with 6 species; 7%). This pattern of faunal composition serves to confirm earlier findings on the zoogeographic diversity of the molluscan elements of this insular fauna, noteworthy for the largest component of the Indo-Pacific faunal element in the eastern Pacific Ocean (Hertlein, 1937; Hertlein & Emerson, 1953; Emerson, 1967, 1978, 1991). Clipperton Island thus is geographically positioned to act as a stepping stone to receive mostly warm-water faunal constituents dispersing eastward from the central Pacific islands and westward from the eastern Pacific mainland (cf. Allison & Holden, 1971).

The few collections of marine mollusks made by expeditions to Clipperton Island have been largely incidental to other studies and were mostly confined to intertidal collecting and to limited shallow-water diving (Emerson, 1993). It is hoped the long planned Clipperton Expedition (April - May, 1994) organized by John D. Jackson and Kirstie L. Kaiser will be able to document the established elements of the molluscan fauna. It would be useful to determine which species are able to maintain reproductively viable populations and those which are newly arrived immigrants that apparently require repeated replenishment by larval recruitment or other dispersal agents, the result of which are transitional, non-self-propagating populations (cf. Vermeij, 1990). The species records that follow (Appendix 1) provide a database for future studies of the biodiversity of this insular molluscan fauna.

ACKNOWLEDGMENTS

I am pleased to acknowledge with thanks the cooperation of a number of people for their aid in the completion of this compilation. Type and other specimens and/or locality data were provided by Gary Rosenberg and Doree Bardes (ANSP), Terrence M. Gosliner and Robert Van Syoc (CAS), Fred G. Thompson and Kurt Auffenberg (FMNH), James H. McLean and Lindsey T. Groves (LACM), David R. Lindberg and Carole S. Hickman (MPB), Alison Trew (NMW), Regina Wetzer (SDNHM), Henry W. Chaney and Paul C. Scott (SBMNH), M. G. Harasewych and Raye N. Germon (USNM), Hugh Bradner (La Jolla, CA), Donald R. Shasky (Redlands, CA), Kirstie L. Kaiser (Salt Lake City, UT) and John D. Jackson (El Cajon, CA). Yves Finet (Muséum d'Histoire Naturelle, Genève, Switzerland), Hugh Bradner, Lindsey T. Groves and E. Alison Kay (University of Hawaii (Honolulu, HI) provided information on critical specimens. I am also indebted to my colleagues at the AMNH, Walter E. Sage, III for technical assistance and Terry McAteer for word-processing the manuscript. James H. McLean kindly reviewed the manuscript and offered helpful suggestions.

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Appendix 1. Shallow Water Marine Mollusks of Clipperton Island (L'ile de Clipperton)

	Faunal Province	Source of Record	Other Eastern Pacific Oceanic Island Occurrences (Source: Bernard, 1983 unless otherwise indicated)	Known from the west-American Continental Borderland
Bivalvia				
Arcidae				
1. Arca mutabilis (Sowerby)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH)	x
2. Barbatia reeveana (d'Orbigny)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH)	x
3. Barbatia divaricata (Sowerby) (=B. laysana (Dall, Bartsch & Rehder) and B. hawaiensis (D. B. & R.), fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Bernard, 1983	-	-
Mytilidae				
4. Lithophaga hancocki Soot-Ryen	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970	Galapagos Ids.	x
5. Lithophaga plumula Hanley	Indo-Pacific & Panamic	Hertlein & Allison, 1966; Bernard, 1983	?Galapagos Ids. (see Finet, 1985)	x
6. Lithophaga calyculata (Carpenter)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Revillagigedo Ids. (Soot-Ryen, 1955); Galapagos Ids.	x
Pinnidae				
7. Pinna rugosa Sowerby	Panamic	Hertlein & Allison, 1966; Salvat & Salvat, 1972; Bernard, 1983	Galapagos Ids. (Finet, 1987)	x
Pteriidae				
8. Pinctada mazatlanica (Hanley)	Panamic	Herlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH; SBMNH)	x
Isognomonidae				
9. Isognomon guadichaudi (d'Orbigny) (=Perna chemnitziana auct. not d'Orbigny, =P. recognita auct.; not Mabille, fide Bernard, 1983)	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; SDNHM	Galapagos Ids. (Finet, 1991)	x
10. Isognomon janus Carpenter	Panamic	Hertlein & Allison, 1966	Cocos Id. (AMNH)	x
Pectinidae				
11. Cyclopecten zacae (Hertlein) (Recorded from 10 to 700 m by Bernard, 1983)	Panamic	Hertlein & Emerson, 1953	Galapagos Ids.	x
Spondylidae				
12. Spondyus tenebrosus Reeve (=S. hawaiensis Dall, Bartsch & Rehder, fide Bernard, 1983)	Indo-Pacific	Salvat & Ehrhardt, 1970; Bernard, 1983	Cocos Id. (AMNH)	-
13. Spondylus linguaefelis Sowerby (=S. gloriosus Dall, Bartsch & Rehder, fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970	-	-

Appendix 1. Shallow Water Marine Mollusks of Clipperton Island (L'ile de Clipperton)

	Faunal Province	Source of Record	Other Eastern Pacific Oceanic Island Occurrences (Source: Bernard, 1983 unless otherwise indicated)	Known from the west-American Continental Borderland
Bivalvia				
Arcidae				
1. Arca mutabilis (Sowerby)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH)	x
2. Barbatia reeveana (d'Orbigny)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH)	x
3. Barbatia divaricata (Sowerby) (=B. laysana (Dall, Bartsch & Rehder) and B. hawaiensis (D. B. & R.), fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Bernard, 1983	-	-
Mytilidae				
4. Lithophaga hancocki Soot-Ryen	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970	Galapagos Ids.	x
5. Lithophaga plumula Hanley	Indo-Pacific & Panamic	Hertlein & Allison, 1966; Bernard, 1983	?Galapagos Ids. (see Finet, 1985)	x
6. Lithophaga calyculata (Carpenter)	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Revillagigedo Ids. (Soot-Ryen, 1955); Galapagos Ids.	x
Pinnidae				
7. Pinna rugosa Sowerby	Panamic	Hertlein & Allison, 1966; Salvat & Salvat, 1972; Bernard, 1983	Galapagos Ids. (Finet, 1987)	x
Pteriidae				
8. Pinctada mazatlanica (Hanley)	Panamic	Herlein & Allison, 1966; Bernard, 1983	Galapagos Ids.; Cocos Id. (AMNH; SBMNH)	x
Isognomonidae				
9. Isognomon quadichaudi (d'Orbigny) (=Perna chemnitziana auct. not d'Orbigny, =P. recognita auct.; not Mabille, fide Bernard, 1983)	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; SDHHM	Galapagos Ids. (Finet, 1991)	x
10. Isognomon janus Carpenter	Panamic	Hertlein & Allison, 1966	Cocos Id. (AMHH)	x
Pectinidae				
11. Cyclopecten zacae (Hertlein) (Recorded from 10 to 700 m by Bernard, 1983)	Panamic	Hertlein & Emerson, 1953	Galapagos Ids.	x
Spondylidae				
12. Spondyus tenebrosus Reeve (=S. hawaiensis Dall, Bartsch & Rehder, fide Bernard, 1983)	Indo-Pacific	Salvat & Ehrhardt, 1970; Bernard, 1983	Cocos Id. (AMNH)	-
13. Spondylus linguaefelis Sowerby (=S. gloriosus Dall, Bartsch & Rehder, fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970	-	-

Ostreidae				
14. Hyotissa hyotis (Linné)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	-
Anomiidae				
15. Anomia peruviana d'Orbigny	Panamic	Hertlein & Emerson, 1953; Bernard, 1983; SBMNH	Galapagos Ids.	x
Lucinidae				
16. Ctena clippertonensis Bartsch & Rehder	Panamic	Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; ANSP; CAS; SDNHM	-	x
17. Codakia distinguenda (Tryon)	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983; CAS	Galapagos Ids. (Finet, 1991)	x
18. Codakia punctata (Linné) (=C. thaanumi Pilsbry, fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	-
Chamidae				
19. Chama buddiana C. B. Adams	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.	x
20. Chama squamuligera Pilsbry & Lowe (=C. rubropicta Bartsch & Rehder, fide Bernard, 1983)	Panamic	Bartsch & Rehder, 1939; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	x
Gastrochaenidae				
21. Gastrochaena ovata Sowerby	Panamic & Atlantic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.	x
Pholadidae				
22. Martesia striata (Linné)	Cosmopolitan	Hertlein & Allison, 1966; Bernard, 1983	-	x
Gastropoda				
Fissurellidae				
1. Diodora granifera (Pease)	Indo-Pacific	Hertlein & Allison, 1966	-	-
Turbinidae				
2. Homalopoma clippertonensis (Hertlein & Emerson), in depths of 135-360 m (Keen, 1971)	Panamic	Hertlein & Emerson, 1953; Keen, 1971	San Benedicto Id. (Keen, 1971)	x
Skeneidae				
3. Pachystremiscus solitarius (Hertlein & Allison), teste J. H. McLean	Endemic	Hertlein & Allison, 1966, 1968	-	-
Neritidae				
4. Nerita plicata Linné	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; CAS	Galapagos Ids. (Mienis, 1992)	-
Littorinidae				
5. Littorina pintado (Wood) (=L. schmitti Bartsch & Rehder)	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP; USNM; SDNHM	-	x

Rissoidae				
6. Amphithalamus trosti Strong & Hertlein	Panamic	Hertlein & Allison, 1968	-	x
Architectonicidae				
7. Heliacus infundibuliformis perrieri (Rochebrune) (=H. infundibuliformis strigatus Hertlein & Allison, 1968, fide Keen, 1971, see Bieler, 1988)	Circumtropical subspecies	Hertlein & Allison, 1966, 1968; Keen, 1971	?	x
Vermetidae				
8. Petaloconchus (Macrophragma) species	?	Hertlein & Allison, 1966	?	?
9. Dendropoma cf. S. platypus (Mörch)	?	Hertlein & Allison, 1966	?	-
Cerithiidae				
10. Cerithium nesioticum Pilsbry & Vanatta	Indo-Pacific	Hertlein & Allison, 1966	-	-
Janthinidae				
11. Janthina janthina (Linné)	Pelagic, circumtropical	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Galapagos Ids. (Finet, 1991)	x
12. Janthina globosa Blainville	Pelagic, circumtropical	Salvat & Ehrhardt, 1970	?	?
Eulimidae				
13. Balcis thaanumi (Pilsbry)	Indo-Pacific	Hertlein & Allison, 1966	-	-
14. Balcis inflexa (Pease) (=Melanella vafra Pilsbry, fide Kay, 1979)	Indo-Pacific	Hertlein & Allison, 1966	-	-
Hipponicidae				
15. Hipponix pilosus (Deshayes) (=H. barbatus Sowerby)	?Circumtropical	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Finet, 1991)	x
16. Hipponix foliaceus (Quoy & Gaimard) (=H. antiquata auct., not Linné, fide Kay, 1979 =? panamensis C. B. Adams; =H. fimbriatus Bartsch & Rehder, fide Keen, 1971)	Indo-Pacific	Bartsch & Rehder, 1939 Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Finet, 1991)	x
Cypraeidae				
17. Cypraea albuginosa Gray	Panamic	Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; USNM	Socorro Id., Cocos Id., Galapagos Ids. (Cate, 1969)	x
18. Cypraea alisonae Burgess	Indo-Pacific	Groves, 1992; SDNHM	Cocos Id. (Burgess, 1985; Shasky, 1989); Galapagos Ids. (Burgess, 1985)	-
19. Cypraea caputserpentis Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	Cocos Id. (Cate, 1969); Galapagos Ids. (Kay, 1991)	x
20. Cypraea depressa Gray	Indo-Pacific	Hertlein, 1937; Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
21. Cypraea helvola Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
22. Cypraea isabellamexicana Stearns (=C. isabella auct., not Linné)	Panamic	Hertlein & Emerson, 1953, 1957; Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; SDNHM; USNM	Socorro Id., (Strong & Hanna, 1930); Cocos Id., Galapagos Ids. (Cate, 1969)	x
23. Cypraea maculifera (Schilder)	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
24. Cypraea moneta Linné	Indo-Pacific	Hertlein, 1937; Hertlein &	Cocos Id.,	x

Ostreidae				
14. Hyotissa hyotis (Linné)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	-
Anomiidae				
15. Anomia peruviana d'Orbigny	Panamic	Hertlein & Emerson, 1953; Bernard, 1983; SBMNH	Galapagos Ids.	x
Lucinidae				
16. Ctena clippertonensis Bartsch & Rehder	Panamic	Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; ANSP; CAS; SDNHM	-	x
17. Codakia distinguenda (Tryon)	Panamic	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983; CAS	Galapagos Ids. (Finet, 1991)	x
18. Codakia punctata (Linné) (=C. thaanumi Pilsbry, fide Bernard, 1983)	Indo-Pacific	Hertlein & Allison, 1966; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	-
Chamidae				
19. Chama buddiana C. B. Adams	Panamic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.	x
20. Chama squamuligera Pilsbry & Lowe (=C. rubropicta Bartsch & Rehder, fide Bernard, 1983)	Panamic	Bartsch & Rehder, 1939; Salvat & Ehrhardt, 1970; Bernard, 1983	Galapagos Ids.	x
Gastrochaenidae				
21. Gastrochaena ovata Sowerby	Panamic & Atlantic	Hertlein & Allison, 1966; Bernard, 1983	Galapagos Ids.	x
Pholadidae				
22. Martesia striata (Linné)	Cosmopolitan	Hertlein & Allison, 1966; Bernard, 1983	-	x
Gastropoda				
Fissurellidae				
1. Diodora granifera (Pease)	Indo-Pacific	Hertlein & Allison, 1966	-	-
Turbinidae				
2. Homalopoma clippertonensis (Hertlein & Emerson), in depths of 135-360 m (Keen, 1971)	Panamic	Hertlein & Emerson, 1953; Keen, 1971	San Benedicto Id. (Keen, 1971)	x
Skeneidae				
3. Pachystremiscus solitarius (Hertlein & Allison), teste J. H. McLean	Endemic	Hertlein & Allison, 1966, 1968	-	-
Neritidae				
4. Nerita plicata Linné	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; CAS	Galapagos Ids. (Mienis, 1992)	-
Littorinidae				
5. Littorina pintado (Wood) (=L. schmitti Bartsch & Rehder)	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP; USNM; SDNHM	-	x

Rissoidae				
6. Amphithalamus trosti Strong & Hertlein	Panamic	Hertlein & Allison, 1968	-	x
Architectonicidae				
7. Heliacus infundibuliformis perrieri (Rochebrune) (=H. infundibuliformis strigatus Hertlein & Allison, 1968, fide Keen, 1971, see Bieler, 1988)	Circumtropical subspecies	Hertlein & Allison, 1966, 1968; Keen, 1971	?	x
Vermetidae				
8. Petaloconchus (Macrophragma) species	?	Hertlein & Allison, 1966	?	?
9. Dendropoma cf. S. platypus (Mörch)	?	Hertlein & Allison, 1966	?	-
Cerithiidae				
10. Cerithium nesioticum Pilsbry & Vanatta	Indo-Pacific	Hertlein & Allison, 1966	-	-
Janthinidae				
11. Janthina janthina (Linné)	Pelagic, circumtropical	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Galapagos Ids. (Finet, 1991)	x
12. Janthina globosa Blainville	Pelagic, circumtropical	Salvat & Ehrhardt, 1970	?	?
Eulimidae				
13. Balcis thaanumi (Pilsbry)	Indo-Pacific	Hertlein & Allison, 1966	-	-
14. Balcis inflexa (Pease) (=Melanella vafra Pilsbry, fide Kay, 1979)	Indo-Pacific	Hertlein & Allison, 1966	-	-
Hipponicidae				
15. Hipponix pilosus (Deshayes) (=H. barbatus Sowerby)	?Circumtropical	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Finet, 1991)	x
16. Hipponix foliaceus (Quoy & Gaimard) (=H. antiquata auct., not Linné, fide Kay, 1979 =? panamensis C. B. Adams; =H. fimbriatus Bartsch & Rehder, fide Keen, 1971)	Indo-Pacific	Bartsch & Rehder, 1939 Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Finet, 1991)	x
Cypraeidae				
17. Cypraea albuginosa Gray	Panamic	Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; USNM	Socorro Id., Cocos Id., Galapagos Ids. (Cate, 1969)	x
18. Cypraea alisonae Burgess	Indo-Pacific	Groves, 1992; SDNHM	Cocos Id. (Burgess, 1985; Shasky, 1989); Galapagos Ids. (Burgess, 1985)	-
19. Cypraea caputserpentis Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	Cocos Id. (Cate, 1969); Galapagos Ids. (Kay, 1991)	x
20. Cypraea depressa Gray	Indo-Pacific	Hertlein, 1937; Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
21. Cypraea helvola Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
22. Cypraea isabellamexicana Stearns (=C. isabella auct., not Linné)	Panamic	Hertlein & Emerson, 1953, 1957; Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; SDNHM; USNM	Socorro Id., (Strong & Hanna, 1930); Cocos Id., Galapagos Ids. (Cate, 1969)	x
23. Cypraea maculifera (Schilder)	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
24. Cypraea moneta Linné	Indo-Pacific	Hertlein, 1937; Hertlein &	Cocos Id.,	x

		Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; USNM	Galapagos Ids. (Cate, 1969)	
25. Cypraea schilderorum Iredale (=C. arenosa Gray, 1824, not Dillwyn, 1823)	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
26. Cypraea scurra Gmelin	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1953, 1957; Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; AMNH; USNM; SDNHM	-	-
27. Cypraea teres Gmelin (=?C. alisonae Burgess)	Indo-Pacific	Groves, 1992; ANSP; AMNH; USNM; SDNHM	Cocos Id. (Groves, 1992); Galapagos Ids. (Burgess, 1985; Groves, 1992; Kay, 1991)	x
28. Cypraea vitellus Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969	-	-
Cassidae				
29. Cypraecassis tenuis Wood	Panamic	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Galapagos Ids. (Finet, 1991)	x
Ranellidae				
30. Cymatium vestitum (Hinds)	Panamic	Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Keen, 1971)	x
31. Cymatium nicobaricum (Röding)	Indo-Pacific	Hertlein & Allison, 1960b	Cocos Id. (Emerson, 1991)	x
Colubrariidae				
32. Colubraria ochsneri Hertlein & Allison	Endemic	Hertlein & Allison, 1966, 1968; Salvat & Ehrhardt, 1970; SDNHM	-	-
Bursidae				
33. Bursa asperrima (Dunker) (misidentified as B. cruentata Röding, teste Alan Beu)	Indo-Pacific	Hertlein & Allison, 1960b; CAS; LACM	Galapagos Ids. (Emerson, 1991)	-
34. Bursa granularis Röding	Circumtropical	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
Tonnidae				
35. Malea ringens (Swainson)	Panamic	Hertlein & Emerson, 1957; Hertlein & Allison, 1960b	Revillagigedo Ids. (CAS); Galapagos Ids. (Finet, 1991)	x
Muricidae				
36. Coralliophila violacea (Kiener)	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Perrin, 1977; SDNHM	Revillagigedo Ids., Cocos Id., Galapagos Ids. (Emerson, 1991)	-
37. Reliquiaecava robillardi (Lienard)	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	x
38. Quoyula madreporarum (Sowerby)	Indo-Pacific	Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; SDNHM	Revillagigedo Ids. (Emerson, 1991)	x
39. Drupa morum Röding	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP; SDNHM	-	-
40. Drupa ricinus (Linné)	Indo-Pacific	Hertlein, 1937; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957;	Cocos Id., Galapagos Ids. (Emerson, 1991)	-

		Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; AMNH; ANSP; SDNHM		
41. Morula uva (Röding)	Indo-Pacific	Hertlein, 1937; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; ANSP	Cocos Id., Guadalupe Id. (Emerson, 1991)	-
42. Thais biserialis (Blainville)	Panamic	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
43. Thais planospira (Lamarck)	Panamic	Smith, 1939; Hertlein & Emerson, 1957; Salvat & Ehrhardt, 1970	Revillagigedo Ids. (Strong & Hanna, 1930); Cocos Id. (Emerson & Old, 1964); Galapagos Ids. (Hertlein & Emerson, 1957)	x
44. Thais speciosa (Valenciennes)	Panamic	Hertlein & Allison, 1960b	Galapagos Ids. (Finet, 1991)	x
45. Plicopurpura patula pansa (Gould)	Panamic	Hertlein & Allison, 1960b	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
46. Nassa serta (Bruguière)	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	-
Buccinidae				
47. Cantharus sanguinolentus (Duclos)	Panamic	Hertlein & Allison, 1960b	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
48. Clivipollia costata (Pease) (=Peristernia thaanumi Pilsbry & Bryan, fide Kay, 1979)	Indo-Pacific (Hawaiian Ids.)	Hertlein & Allison, 1966	-	-
49. Clivipollia fragaria (Wood) (=Peristernia carolinae Kiener, fide Abbott & Dance, 1982)	Indo-Pacific	Salvat & Ehrhardt, 1970; ANSP; SDNHM	Cocos Id. (Emerson, 1991)	-
Nassariidae				
50. Nassarius catallus (Dall) in depths of 37-333 m (Keen, 1971)	Panamic	Hertlein & Emerson, 1953	Galapagos Ids. (Keen, 1971)	x
Fasciolariidae				
51. Fasciolaria princeps Sowerby	Panamic	Hertlein & Allison, 1966	Galapagos Ids. (Finet, 1991)	x
52. Latirus socorroensis Hertlein & Strong (=L. clippertonensis Hertlein & Allison, fide Keen, 1971)	Panamic (Insular restricted)	Hertlein & Allison, 1966, 1968; Salvat & Ehrhardt, 1970; Keen, 1971	Revillagigedo Ids. (Keen, 1971)	-
Harpidae				
53. Harpa gracilis Broderip & Sowerby	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Rehder, 1973	-	-
Mitridae				
54. Mitra edentula Swainson	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	-
55. Mitra ferruginea Lamarck	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Cocos Id. (Emerson, 1991)	-
56. Mitra papalis (Linné)	Indo-Pacific	Hertlein, 1937; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Perrin, 1977; SDNHM	Cocos Id. (Emerson, 1991)	-

		Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; USNM	Galapagos Ids. (Cate, 1969)	
25. Cypraea schilderorum Iredale (=C. arenosa Gray, 1824, not Dillwyn, 1823)	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969; AMNH	-	-
26. Cypraea scurra Gmelin	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1953, 1957; Hertlein & Allison, 1960a; Cate, 1969; Salvat & Ehrhardt, 1970; ANSP; AMNH; USNM; SDNHM	-	-
27. Cypraea teres Gmelin (=?C. alisonae Burgess)	Indo-Pacific	Groves, 1992; ANSP; AMNH; USNM; SDNHM	Cocos Id. (Groves, 1992); Galapagos Ids. (Burgess, 1985; Groves, 1992; Kay, 1991)	x
28. Cypraea vitellus Linné	Indo-Pacific	Hertlein & Allison, 1960a; Cate, 1969	-	-
Cassidae				
29. Cypraecassis tenuis Wood	Panamic	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Galapagos Ids. (Finet, 1991)	x
Ranellidae				
30. Cymatium vestitum (Hinds)	Panamic	Salvat & Ehrhardt, 1970; ANSP	Galapagos Ids. (Keen, 1971)	x
31. Cymatium nicobaricum (Roding)	Indo-Pacific	Hertlein & Allison, 1960b	Cocos Id. (Emerson, 1991)	x
Colubrariidae				
32. Colubraria ochsneri Hertlein & Allison	Endemic	Hertlein & Allison, 1966, 1968; Salvat & Ehrhardt, 1970; SDNHM	-	-
Bursidae				
33. Bursa asperrima (Dunker) (misidentified as B. cruentata Röding, teste Alan Beu)	Indo-Pacific	Hertlein & Allison, 1960b; CAS; LACM	Galapagos Ids. (Emerson, 1991)	-
34. Bursa granularis Roding	Circumtropical	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
Tonnidae				
35. Malea ringens (Swainson)	Panamic	Hertlein & Emerson, 1957; Hertlein & Allison, 1960b	Revillagigedo Ids. (CAS); Galapagos Ids. (Finet, 1991)	x
Muricidae				
36. Coralliophila violacea (Kiener)	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Perrin, 1977; SDHHM	Revillagigedo Ids., Cocos Id., Galapagos Ids. (Emerson, 1991)	-
37. Reliquiaecava robillardi (Lienard)	Indo-Pacific	Bartsch & Rehder, 1939; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	x
38. Quoyula madreporarum (Sowerby)	Indo-Pacific	Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; SDNHM	Revillagigedo Ids. (Emerson, 1991)	x
39. Drupa morum Roding	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; ANSP; SDNHM	-	-
40. Drupa ricinus (Linné)	Indo-Pacific	Hertlein, 1937; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957;	Cocos Id., Galapagos Ids. (Emerson, 1991)	-

		Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; AMNH; ANSP; SDNHM		
41. Morula uva (Röding)	Indo-Pacific	Hertlein, 1937; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Hertlein & Allison, 1960b; ANSP	Cocos Id., Guadalupe Id. (Emerson, 1991)	-
42. Thais biserialis (Blainville)	Panamic	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
43. Thais planospira (Lamarck)	Panamic	Smith, 1939; Hertlein & Emerson, 1957; Salvat & Ehrhardt, 1970	Revillagigedo Ids. (Strong & Hanna, 1930); Cocos Id. (Emerson & Old, 1964); Galapagos Ids. (Hertlein & Emerson, 1957)	x
44. Thais speciosa (Valenciennes)	Panamic	Hertlein & Allison, 1960b	Galapagos Ids. (Finet, 1991)	x
45. Plicopurpura patula pansa (Gould)	Panamic	Hertlein & Allison, 1960b	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
46. Nassa serta (Bruguière)	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	-
Buccinidae				
47. Cantharus sanguinolentus (Duclos)	Panamic	Hertlein & Allison, 1960b	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
48. Clivipollia costata (Pease) (=Peristernia thaanumi Pilsbry & Bryan, fide Kay, 1979)	Indo-Pacific (Hawaiian Ids.)	Hertlein & Allison, 1966	-	-
49. Clivipollia fragaria (Wood) (=Peristernia carolinae Kiener, fide Abbott & Dance, 1982)	Indo-Pacific	Salvat & Ehrhardt, 1970; AHSP; SDNHM	Cocos Id. (Emerson, 1991)	-
Hassariidae				
50. Nassarius catallus (Dall) in depths of 37-333 m (Keen, 1971)	Panamic	Hertlein & Emerson, 1953	Galapagos Ids. (Keen, 1971)	x
Fasciolariidae				
51. Fasciolaria princeps Sowerby	Panamic	Hertlein & Allison, 1966	Galapagos Ids. (Finet, 1991)	x
52. Latirus socorroensis Hertlein & Strong (=L. clippertonensis Hertlein & Allison, fide Keen, 1971)	Panamic (Insular restricted)	Hertlein & Allison, 1966, 1968; Salvat & Ehrhardt, 1970; Keen, 1971	Revillagigedo Ids. (Keen, 1971)	-
Harpidae				
53. Harpa gracilis Broderip & Sowerby	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Rehder, 1973	-	-
Mitridae				
54. Mitra edentula Swainson	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	-	-
55. Mitra ferruginea Lamarck	Indo-Pacific	Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970	Cocos Id. (Emerson, 1991)	-
56. Mitra papalis (Linné)	Indo-Pacific	Hertlein, 1937; Hertlein & Allison, 1960b; Salvat & Ehrhardt, 1970; Perrin, 1977; SDNHM	Cocos Id. (Emerson, 1991)	-

57.	Mitra effusa Swainson	Panamic	Hertlein & Allison, 1960b	Galapagos Ids. (Keen, 1971)	x
58.	Mitra lignaria Reeve	Panamic	Hertlein & Allison, 1960b	-	x
59.	Strigatella litterata (Lamarck)	Indo-Pacific	Salvat & Ehrhardt, 1960	-	-
Conidae					
60.	Conus ebraeus Linné (=C. vermiculatus Lamarck, fide Hanna, 1963)	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1957; Hanna, 1963; Allison, 1959; Salvat & Ehrhardt, 1970; AHSP; USHM; SBMNH; SDHHM	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
61.	Conus chaldaeus Roding	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; AHSP; USNM; SBMNH; SDHHM	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
62.	Conus diadema Sowerby	Panamic	Allison, 1959; Salvat & Ehrhardt, 1970; ANSP; SBMNH; SDHHM	Revillagigedo Ids., Galapagos Ids. (Hanna, 1963)	x
63.	Conus purpurascens Sowerby	Panamic	Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; Perrin, 1977; AHSP; USHM; SDHHM	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
64.	Conus tiaratus Sowerby (=C. roosevelti Bartsch & Rehder, fide Hanna, 1963)	Panamic	Dall, 1910; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; Perrin, 1977; AHSP; USHM; SBMNH	Galapagos Ids. (Hanna, 1963)	x
65.	Conus tessulatus Born (=C. edaphus Dall, fide Hanna, 1963)	Indo-Pacific	Hertlein & Allison, 1960a	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
66.	Conus gradatus Wood	Panamic	Hertlein & Allison, 1960a; Salvat & Ehrhardt, 1970	-	x
67.	Conus brunneus Wood	Panamic	Dall, 1910; Hertlein, 1937; Hanna & Strong, 1949; Hertlein & Allison, 1960a; USHM; SDHHM	Cocos Id., Galapagos Ids. (Hanna, 1963)	x
Terebridae					
68.	Terebra crenulata (Linné)	Indo-Pacific	Hertlein & Allison, 1960b	Revillagigedo Ids., Cocos Id. (Emerson, 1991)	-
Pyramidellidae					
69.	Odostomia limbaughi Hertlein & Allison	?Endemic	Hertlein & Allison, 1968	-	-
70.	Turbonilla clippertonensis Hertlein & Allison	?Endemic	Hertlein & Allison, 1968	-	-

[Records of Gastropoda rejected, as highly questionable: Purpura nuttalli Conrad (Hertlein & Emerson, 1953); Voluta ancilla Solander (Lowe, 1933); Voluta deshayesii Reeve (Dall, 1910; Lowe, 1933; Hertlein, 1937); Pugilina lactea (Reeve) (Hertlein & Allison, 1966), as these are early reports that have not been confirmed by subsequent field collection.]

Abbreviations used for institutional collections: AMNH = American Museum of Natural History, New York; ANSP = Academy of Natural Sciences of Philadelphia, PA; CAS = California Academy of Sciences, San Francisco, CA; SBMNH = Santa Barbara Museum of Natural History, CA; SDNHM = San Diego Natural History Museum, CA; USNM = National Museum of Natural History (U.S. Natural History Museum collection), Washington, D.C.

For convenience, the classification generally follows that used by Keen (1971).

57. Mitra effusa Swainson	Panamic	Hertlein & Allison, 1960b	Galapagos Ids. (Keen, 1971)	x
58. Mitra lignaria Reeve	Panamic	Hertlein & Allison, 1960b	-	x
59. Strigatella litterata (Lamarck)	Indo-Pacific	Salvat & Ehrhardt, 1960	-	-
Conidae				
60. Conus ebraeus Linné (=C. vermiculatus Lamarck, fide Hanna, 1963)	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1957; Hanna, 1963; Allison, 1959; Salvat & Ehrhardt, 1970; ANSP; USNM; SBMNH; SDNHM	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
61. Conus chaldaeus Röding	Indo-Pacific	Hertlein, 1937; Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; ANSP; USNM; SBMNH; SDNHM	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
62. Conus diadema Sowerby	Panamic	Allison, 1959; Salvat & Ehrhardt, 1970; ANSP; SBMNH; SDNHM	Revillagigedo Ids., Galapagos Ids. (Hanna, 1963)	x
63. Conus purpurascens Sowerby	Panamic	Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; Perrin, 1977; ANSP; USNM; SDNHM	Cocos Id. (Montoya, 1983); Galapagos Ids. (Finet, 1991)	x
64. Conus tiaratus Sowerby (=C. rooseveltí Bartsch & Rehder, fide Hanna, 1963)	Panamic	Dall, 1910; Bartsch & Rehder, 1939; Hertlein & Emerson, 1957; Allison, 1959; Salvat & Ehrhardt, 1970; Perrin, 1977; ANSP; USNM; SBMNH	Galapagos Ids. (Hanna, 1963)	x
65. Conus tessulatus Born (=C. edaphus Dall, fide Hanna, 1963)	Indo-Pacific	Hertlein & Allison, 1960a	Cocos Id., Galapagos Ids. (Emerson, 1991)	x
66. Conus gradatus Wood	Panamic	Hertlein & Allison, 1960a; Salvat & Ehrhardt, 1970	-	x
67. Conus brunneus Wood	Panamic	Dall, 1910; Hertlein, 1937; Hanna & Strong, 1949; Hertlein & Allison, 1960a; USNM; SDNHM	Cocos Id., Galapagos Ids. (Hanna, 1963)	x
Terebridae				
68. Terebra crenulata (Linné)	Indo-Pacific	Hertlein & Allison, 1960b	Revillagigedo Ids., Cocos Id. (Emerson, 1991)	-
Pyramidellidae				
69. Odostomia limbaughi Hertlein & Allison	?Endemic	Hertlein & Allison, 1968	-	-
70. Turbonilla clippertonensis Hertlein & Allison	?Endemic	Hertlein & Allison, 1968	-	-

[Records of Gastropoda rejected, as highly questionable: Purpura nuttalli Conrad (Hertlein & Emerson, 1953); Voluta ancilla Solander (Lowe, 1933); Voluta deshayesii Reeve (Dall, 1910; Lowe, 1933; Hertlein, 1937); Pugilina lactea (Reeve) (Hertlein & Allison, 1966), as these are early reports that have not been confirmed by subsequent field collection.]

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For convenience, the classification generally follows that used by Keen (1971).

XENOPHORA ROBUSTA (VERRILL, 1870)

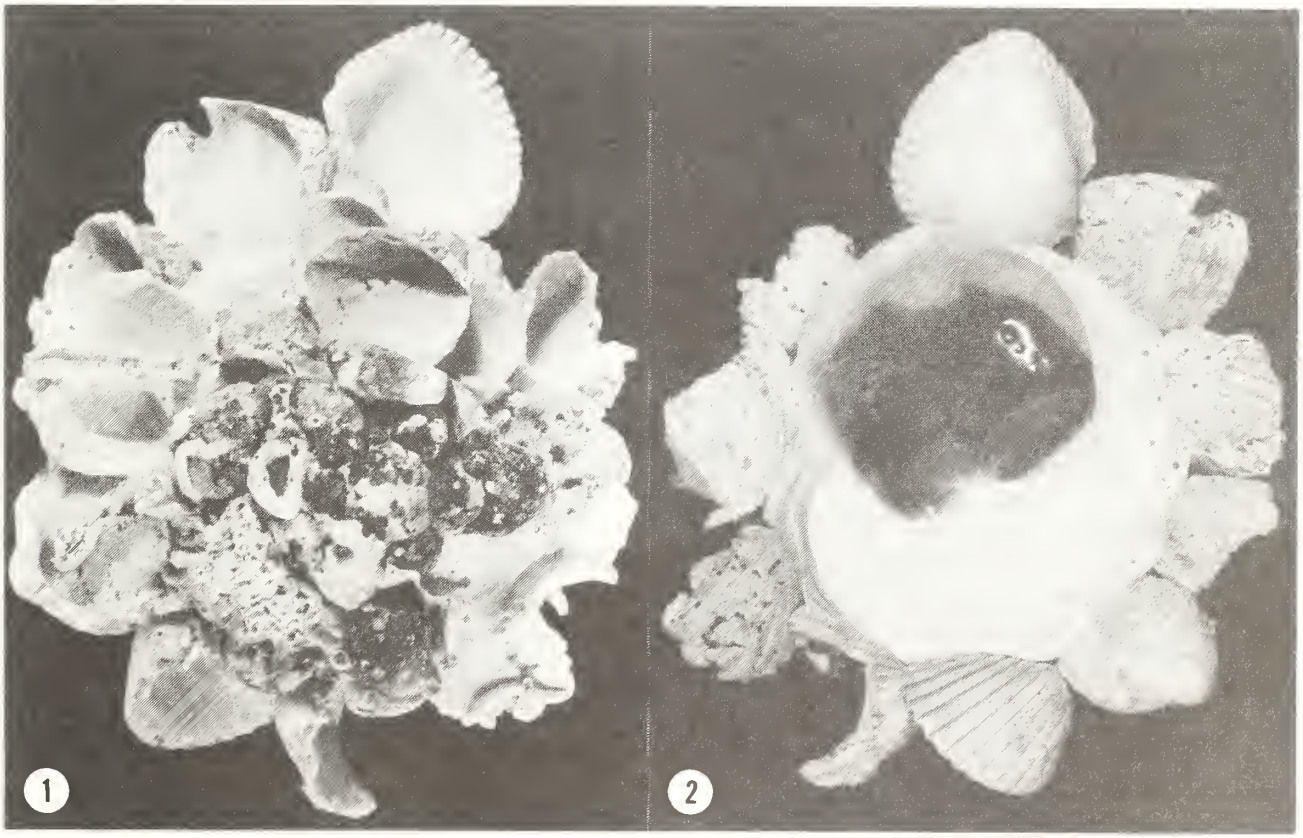
KIM C. HUTSELL

5804 Lauretta Street #2, San Diego, California 92110

For some reason, *Xenophora robusta* (Verrill, 1870), was one of those species I'd always dismissed as something I personally would never find. For one thing, I was always under the impression they were in very deep water since Keen (1971) lists them as being found "mostly offshore in depths of 45 to 50 meters." I knew that both Margaret and Dave Mulliner and Carol and Paul Skoglund had dredged specimens from the deep trenches of Bahía Escondido. Also, my eyes aren't what they used to be and at times everything under water looks like a *Xenophora*. But, as happens with so many fiinds, fate would place one where I couldn't miss it.

One of our favorite dive sites in Baja is under the old concrete pier at the mouth of Bahía Escondido. At about 10 meters, there is a tangle of concrete chunks, rebar, old tires, cables, ropes, and a lot of odds and ends tossed or lost overboard over the years. And nearly everywhere one looks, there are empty bottles among the debris--dozens of them. It is quite literally an underwater dump where the sea life flourishes.

It was the discarded bottles that led me to venture out onto the sand away from the pier and into slightly deeper water. I've found that the two largest species of *Crucibulum* in the Sea of Cortez,



Figures 1 & 2. *Xenophora robusta* (Verrill, 1870), taken live on sand at 15 meters. Leg. K. C. Hutsell, October 19, 1993 (1) view from spire (2) basal view. Photos: David K. Mulliner.

Crucibulum spinosum (Sowerby, 1824) and *C. scutellatum* (Wood, 1828) seem to have an affinity for anything glass and when found growing on an old beer bottle, the shells are beautifully shaped to the curvature of the glass and very clean. Especially nice specimens of *C. spinosum* grow on any portion of the bottle buried in the sand where the long spines are protected from erosion and predation. Both species can be slid off the glass with relative ease and if one is a bit stubborn, the bottle can be broken without damaging the specimen.

As I went from bottle to bottle looking for *Crucibulum*, I scanned the bottom for more. At about 15 meters, I reached for a beer bottle and a sudden movement about a meter in front of me caught my attention. It seemed to be nothing but a clump of seaweed, but remembering what Larry Buck had told me about finding various species under clumps of vegetation, I picked it up and turned it over. Even as I held it in my hand, I couldn't quite believe I was looking at a rather large specimen of *Xenophora robusta* -- and a live one at that! I was so absorbed in what I'd found that I completely forgot to look for more and ended the dive early.

The specimen (Figures 1, 2) measures approximately 65 mm in width and 52 mm in height, not including attachments. The majority of the attachments are small pebbles on the upper whorls. The last two whorls are covered mostly with valves of *Trigoniocardia biangulata* (Broderip & Sowerby, 1829). There is also one valve of *Anadara multicostata* (Sowerby, 1833), one *Crucibulum spinosum*, and one valve of *Chione californiensis* (Broderip, 1835).

LITERATURE CITED

KEEN, A. MYRA
1971. Sea shells of tropical west America, 2nd ed. Stanford Univ. Press, Stanford, California. 1064+ pp., ca 4000 text figs.

IN MEMORIAM

ROSE D'ATTILIO
1914 - 1994

With sadness we report the passing of Rose D'Attilio on April 19, 1994. Rose was a Club member for over 25 years who collected shells and fossils because she enjoyed their beauty. Her interest drew her to work part-time for many years at the La Jolla Cave and Shell Shop where she was a treasured employee. Longtime members of the Club will always remember with affection seeing Rose at Club functions enjoying the music and interpreting it in her own special way.

Rose is survived by her husband Anthony, daughter Sandra, son Lawrence, seven grandchildren and two great-grandchildren.

BOOK NEWS

Architectonicidae of the Indo-Pacific (Mollusca, Gastropoda)
By: Rüdiger Bieler. 1993.
Abhandlungen des Naturwissenschaftlichen Vereins in Hamburg, vol. 30, 377 pp., 286 figs.
Publisher: Gustav Fischer Verlag, Stuttgart.
Price: 168 German marks (approximately $100) [Soon to be available from U.S. book distributors.]

This is an excellent source of information on an important but little known family. The scope of the book is summarized on the back cover:

"For the first time in over 100 years, the marine gastropod family Architectonicidae, commonly known as sundials, has been monographed for the Indo-Pacific. Ranging from the temperate regions to the tropics, and from the intertidal zone to oceanic depths, the morphologically diverse sundials are not only popular, but are of current interest in gastropod phylogenetic systematics because they form a main clade within the problematic 'lower heterobranchs.'

"This volume covers all living species in the Indian and Pacific Oceans (east Africa to the west coast of the Americas), illustrated by over 600 photographs, scanning electron micrographs, maps, and other figures. An introductory section summarizes morphology and anatomy, reproduction and larval development, habitat and diet, phylogeny, and the fossil record. Zoogeographic analyses recognize large areas of distribution for most species, in contrast to previous assumptions of endemism. Of the 250 species-level names discussed, 88 species in 11 genera are recognized as valid. Additionally, 20 species are described as new. The taxonomic section treats each species in detail, including synonymies and redescriptions based on examination of more than 22,000 specimens from over 50 international museum collections, as well as from original field work. All available type specimens were examined and are listed and illustrated. Taxonomic characters emphasize a 'finger-print' pattern of homologous spiral ribs on the postlarval shell, as well as species-typical size range and morphology of the larval shell. Comparisons are made with the Atlantic members of the family.

"Also included is a bibliography of nearly 800 titles, making this work one of the most complete general references for Indo-Pacific mollusks."

I can add that the book is a model example of what is needed in the many gastropod families that remain to be monographed. Now it is possible to identify specimens of every species occurring in the Indo-Pacific and, the title notwithstanding, those of the Eastern Pacific as well. Shells are illustrated in black and white with apertural, basal, and apical views, usually with SEM views of protoconchs and early teleoconch sculpture. Illustrations are conveniently located close to the text. Locality data are summarized, which saves space in the text. Three color plates are included, one that gives apical views of 10 differrent species of *Architectonica*, one showing living animals and one showing developmental stages. Unfortunately, the price is steep, but well worth it.

This work is based on the doctoral dissertation and continuing research of Rüdiger Bieler, Associate Curator of Mollusks at the Field Museum of Natural History, Chicago. His long series of publications on the family began in 1982. This volume gives generic diagnoses and the full treatment of each species, but refers to his earlier papers for the detailed discussion (in German) pertaining to each of the genera. Remarks on relationships and phylogeny are briefly given; a more detailed account appeared in his contribution to the volume "Prosobranch Phylogeny" (1988, Malacological Review, Supplement 4, pp. 205-240). Although phylogenetic analysis demonstrated the existence of three clades, unresolved problems remain and a revised classification at the subfamily level is deferred for future work. According to Bieler (pers. comm.), the living species of the Atlantic (approximately 32) are to be reviewed by Bieler, Merrill, and Boss (based in part on the 1970 Ph.D. dissertation work of A. S. Merrill), which will complete the worldwide coverage of living architectonicids. The fossil record will also be treated, with contributions to the Treatise of Invertebrate Paleontology, and a contribution to the series on the Neogene paleontology of the Dominican Republic.

James H. McLean,
Natural History Museum of Los Angeles County

CLUB NEWS (cont'd)

The Bizarre Bazaar

The fifth annual Bizarre Bazaar held in Margaret and Dave Mulliner's garden was a most enjoyable event. About fifteen people brought their tables and set up their shells and swapped, bought and sold, and admired as they nibbled on the snacks and drinks provided by the Mulliners. It was a chilly and cloudy afternoon but the interest in the beautiful shells displayed was hot and the comaraderie definitely very warm.

Again, the Bizarre Bazaar was a big hit. The Club's thanks to the Mulliners for hosting the event.

Additions and Changes to the Roster

New Members

Adams, Marilu, 16677 Diaz Dr., San Diego, CA 92128, (619)-673-0540
Gagliano, Greg, 15638 W. 149 Terrace, Olathe, KS 66062-4762, (913) 780-6281
Hames, Charles, Naval Medical Center, San Diego, CA 92134-5001, (619) 235-0242 x3628 (work)
Sumrall, Burl & Song, P.O. Box 120723 Chula Vista, CA 91912, (619) 476-9420
Trego, Kent D., 3895 La Selva Dr., Palo Alto, CA 94306
Vollero, Silvana & Bob, 8860 Villa La Jolla Dr., #109, La Jolla, CA 92037, (619) 625-0756
William, Kent, 4015 Crown Point Dr., #306, San Diego, CA 92109, (619) 272-0349
Zidek, Jiri, P.O. Box 95, Socorro, NM 87801, (505) 835-5524 (office)

Changes to the Roster

D'Attilio, Anthony, c/o Sandra Booth, 2315 Hillview Dr., Laguna Beach, CA 92651, (714) 494-7943
Hutsell, Linda & Kim, 5804 Lauretta St. #2, San Diego, CA 92110, (619) 294-3914
Levin, Debra (change area code) (909) 655-6702
Piech, Betty Jean (change of address) Cokesbury Village, Cottage 19, 726 Loveville Rd., Hockessin, DE 19707-1504, (302) 234-4317

Deadline Approaches for World Size Record Supplement

Larry Buck reports that the new editor of the **World Size Record Supplement** will be accepting entries up to June 15th for the next **Supplement.** Send your verified submissions to: Mrs. Barbara Haviland, Editor, 6950 46th Ave. N, St. Petersburg, FL 33709.

27th Annual Meeting of the WSM

The Western Society of Malacologists annual meeting will be held from June 26-30, 1994 at the Miramar Hotel on the beach in Santa Barbara. It promises to be an exciting meeting with two symposia (one on molluscan biogeography and the second on micromollusks), contributed papers and many social activities including a president's reception at the Sea Center of the Santa Barbara Natural History Museum, traditional auction, and closing reception and banquet at the main museum.

There is still time to register. Contact Treasurer Dr. Henry W. Chaney, Santa Barbara Museum of Natural History, 2559 Puesta del Sol Rd, Santa Barbara, CA 93105. Phone: (805) 682-4711, x334 or Fax: (805) 569-3170.

Correction: In Robert Koch's article, "Panamic Puzzles; a Question of Assignment" in the May 1994 issue of **The Festivus** [Vol. XXVI(5):53-55], the legend for Figure 6 should state, "Nucleus of specimen illustrated in Figure 4" not in Figure 2.

THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

The Bathyscaph **Trieste** Revisited

John Michel, Club member and former leading engineer aboard the Bathyscaph **Trieste** from 1959-1962 and 1965-1968, will present a slide program and tell about his experiences on the submersible which still holds the record for the deepest dives down to 35,800 feet in the Challenger Deep off Guam.

Meeting date: July 21, 1994
Shells of the month: Deepwater shells

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - June 16, 1994

At 7:40 p.m. the meeting was called to order by Vice President Larry Buck. Minutes of the May meeting were approved as published in **The Festivus**.

Guests and new members were introduced and Larry thanked the Hertzes and Mulliners for providing the evening's refreshments. He said that The Club Science Fair winner, James Sullivan Gibilisco, would not be able to present his project this month since this was the night of his graduation.

Dave then introduced the evening's speaker, Bob Yin, Club member and award winning underwater photographer. Bob gave a marvelous program on his recent visits to the Philippines. He showed slides of the remote Balut Island in the south of the Philippines in the Celebes Sea, telling that it had the largest tangle net operation in the Philippines, mostly run by Indonesians.

He followed with views from his favorite areas in the Sulu Sea. He visited there in May and the sea was very calm. In some of his shots of boobies, the birds seemed to be coming right out of the screen. Bob also showed some incredible underwater images of some species of tridacnas with their mantles exposed -- closeups of the vivid mantles which made the audience gasp.

Bob also took us to Batangas where he dived with President Ramos and then on to Cebu in the central Philippines to see the shell markets where mountains of shells were being cleaned and prepared for the shell trade. It was a disturbing sight. He followed this with views of living mollusks in their habitats with the audience trying to identify the creatures. It was a wonderful program which everyone enjoyed.

After the program, the shell drawing was held and the prize was won by Ron McPeak. The members then enjoyed the refreshments and the opportunity to socialize.

Additions and Corrections to the Roster

New Member

Olsen, Lee F., P.O. Box 99941, San Diego, CA 92169, (619) 274-3392

Correction to the Roster

William Kent's name was listed as Kent William in the last issue. Other information is correct.

The September Party--with a Greek Theme

The September party will be held at the home of Marge and Hugh Bradner on Saturday evening, September 24th. Details will follow in the August issue, but mark your calendars so you will not miss this affair--and get your Greek outfits ready.

A Change in Historians

Linda Hutsell, recently returned to San Diego from Topeka, Kansas, has agreed to be historian once again. Linda had brought the historian's books beautifully up-to-date and made them readily available to the membership during the almost three years (1991-1993) she was historian. Our thanks to Linda and also to Pat Boyd who held the position while the Hutsells were in Kansas.

San Diego Shell Club to Host COA in '95

The Conchologists of America convention will be held in San Diego on June 23-29, 1995 with the San Diego Shell Club as host. The convention will be held at the beautiful Pan Pacific Hotel in downtown San Diego near the water. There will be much to do to make this meeting a success. If you are interested in helping, contact Don Pisor, convention chairperson at (619) 279-9342.

CLIPPERTON '94: AN INITIAL REPORT

MICHAEL SMALL

Embajada de Canada, Apartado Postal 105-05 Mexico,
D. F. 11580, Mexico

From April 7th to May 7th this year, I had the opportunity to participate in a remarkable venture - the Clipperton '94 Expedition, organized by San Diego Shell Club members John Jackson and Kirstie Kaiser. Clipperton '94 took more than two years of planning and brought together 22 people with a keen interest in the marine life of the tropical eastern Pacific. Dr. Peter Glynn of the University of Miami and Dr. J.E.N. (Charlie) Veron of the Australian Institute of Marine Science came to survey the corals of Clipperton. Dr. Jerry Allen of the Western Australian Museum of Natural History and Dr. Ross Roberston of the Smithsonian Tropical Research Institute were interested in the fish species there to complete their forthcoming book on the fish of the tropical eastern Pacific. Dr. Robert Van Syoc of the California Academy of Sciences came to collect a variety of marine invertebrates, along with Ron McPeak, who made a special collection for the Academy of the endemic terrestrial beetles of Clipperton. A group of marine geologists from Rice University came to take core samples from large coral heads to complete their survey of temperature, current and rainfall variations over the past three hundred years in the tropical eastern Pacific. Dr. Henry Chaney of the Santa Barbara Museum of Natural History was the professional malacologist on board, accompanied by four other keen members of the "mollusc team" - Kirstie Kaiser, Marty Beals, Charlie Waters and me. Finally there were five semi-professional or professional photographers aboard - two shooting film, one video and three using still cameras. We made the voyage from San Diego to Clipperton on the well appointed and very ably crewed long range sport fishing boat based in San Diego, the **Royal Star.** All told we travelled more than 3400 nautical miles and spent a month to get to Clipperton and back. This was longer than virtually any of us on board, apart from the crew, had ever spent at sea.

Two factors about Clipperton motivated us to undertake this trip. First, Clipperton is the most remote island in the tropical eastern Pacific - indeed, it is the most remote coral atoll in the world. It is located 690 nautical miles southwest of Acapulco at 10 degrees north of the Equator, directly within the influence of the North Equatorial Countercurrent and the periodic El Niño events. As a result, Clipperton harbours a higher percentage of Indo-Pacific marine fauna than any other island in the tropical eastern Pacific. Our first objective was to assess the balance of Indo-Pacific versus Panamic species in the molluscs of Clipperton and to see if we could find any new Indo-Pacific records resulting from recent El Niño events. Both the coral and fish experts on board shared the same goal. Our second objective was to see if any new records or even new species might be found by collecting with SCUBA at Clipperton. Oddly enough, although the island has been often visited in recent decades by commercial or sport fishermen from Mexico or California, and by yachts making the run from Acapulco to Polynesia, before our expedition no one had ever conducted a full scale survey of the underwater life there. The last scientific expedition to Clipperton took place in 1958 - the Doldrums Expedition on the U.S. research vessel **Spencer F. Baird.** Because of the more primitive diving technology in that era, and the prevailing views about sharks, its members spent little time diving around the island. Cousteau visited the island in 1977, but shot virtually no underwater footage, preferring to concentrate on the terrestrial crabs and nesting bird populations on the island and the algae filled, brackish lagoon. As a result, virtually all of the molluscs that have been recorded from Clipperton were collected intertidally, or as beach specimens.

The seven days of travel time from San Diego to Clipperton gave us plenty of time for idle speculation about what we might find. We took with us a draft copy of Bill Emerson's very valuable article that appeared in the June issue of **The Festivus** (Emerson, 1994). Based on the existing literature, Emerson has produced a mollusc species list for Clipperton of 22 bivalves and 70 gastropods. Forty-one of these species or 45 percent are Indo-Pacific; 40 of these species or 43 percent are Panamic; 6 species or 7 percent are circumtropical; 3 species or 3 percent are thought to be endemic; and two Vermetidae species have not been fully identified. Given the dramatic increase in species recorded from Cocos Island over the last ten years once a concerted effort was made to survey the molluscs there using SCUBA, dredging and tangle netting, we reckoned we could greatly increase the number of species recorded from Clipperton.

We also passed the time speculating about sharks. Clipperton has a tremendous reputation for sharks - even Cousteau's team claimed that they were driven out of the water by them. Just before departure we were visited on board by Bill Irwin, who has traveled there seven times as a dolphin monitor on tuna boats. Irwin cheerfully informed us that fish caught while at anchor at Clipperton routinely come up just as bleeding heads on the line, as the circling sharks strip them of their flesh. I noted with mild concern while reading Jimmy Skaggs' book on Clipperton (Skaggs, 1989) that none other than Franklin D. Roosevelt had recorded the same phenomenon when he fished there in the mid 1930s. John Jackson had assured us, based on careful consultation with fishing captains who know the waters around the island that the relatively high water temperatures in April keep the shark population down. Still, I reckoned that just one or two close encounters with an aggressive tiger shark would put a major dent in our enthusiasm to dive.

The other potential hazard on the horizon, as always, was the weather. The trip had been planned to avoid the cyclone season in the eastern Pacific and we were told to expect good weather. However, Clipperton is a small circular atoll, about 2.5 miles in diameter, exposed to oceanic swells from all directions with no safe anchorages or real lee side. The videos made both by Bill Irwin and Cousteau recorded how heavy the surf was around the island and their difficulty in finding a safe spot to land. I prepared myself mentally for a bumpy ride.

Our first sight of Clipperton on the horizon was the curved "sail" of Clipperton Rock - the jagged and heavily weathered tip of the submerged mountain on which the atoll was formed. The Rock juts out of the sand on the eastern side of the island to a height of about 20 metres. As we got closer, we could see that, apart from the rock, the island is otherwise flat. Clipperton is a closed ring of coarse sand and broken coral, about 3 metres high, 200 metres wide and about 12 kilometres around. It encloses a lagoon filled with brackish water and algae. Its "skyline" is punctuated by small groves of palms - one here, two there - which we used as landmarks to determine where we were around the island. The island is overrun by tens of thousands of nesting boobies and millions of scarlet red land crabs. The curved geography of the atoll, the limited number of landmarks and omnipresent hordes of crabs give Clipperton the feel of a small, malevolent, self-contained planet. It is a harsh but compelling landscape (Figure 1).

Once we arrived, my preoccupations about the diving proved to be groundless. The much vaunted schools of sharks never materialized - much to the chagrin of at least one of our expedition members who had come on the trip to photograph them. Five or six foot silky sharks would readily show up if you swam away from the reef into the blue water. They would circle around for a quick look and then usually leave. But over the reef top and slope where we concentrated our diving during the daytime, sharks were nowhere to be seen. The one potentially dangerous shark sighted during our thirteen days at Clipperton was a medium-sized Galapagos shark which showed up while our crew were fishing at dusk. The only sharks most of us saw while at Clipperton were on an endless procession of "shark motif" T-shirts that Kirstie Kaiser wore every morning.

The warm water around the reefs in April may have partially explained the absence of sharks. An equally probable cause, however, is that a number of Mexican fishing boats reportedly fished several thousand sharks around Clipperton in late 1993 for their fins. The current shark population is probably much reduced compared to those encountered by earlier expeditions. Whatever the reason, I had no

cause for complaint. Meanwhile whatever Clipperton may lack in sharks, it makes up for in moray eels. I have never seen so many menacing and occasionally aggressive free swimming morays as I saw there. They took a chunk out of the hand of one unwary expedition member, and attempted to bite several more of us. As for the swells, they proved to be tolerable during the day and after a very rough first night, we found one side of the island that offered a relatively calm anchorage at night. Nevertheless, landing on the beach was difficult, due to the surf and the fringing coral. There are two landing sites on the island (Figure 2) where gaps in the coral along the reef make it possible to get through the surf in a rubber raft. Nevertheless, we could only make it ashore about half of the days we were there and the pounding surf around most of the island just about ruled out snorkelling in shallow water. I spent a gruelling

Figure 1. Clipperton Island as seen from the Royal Star. Photo from a color slide by Richard Herrmann.

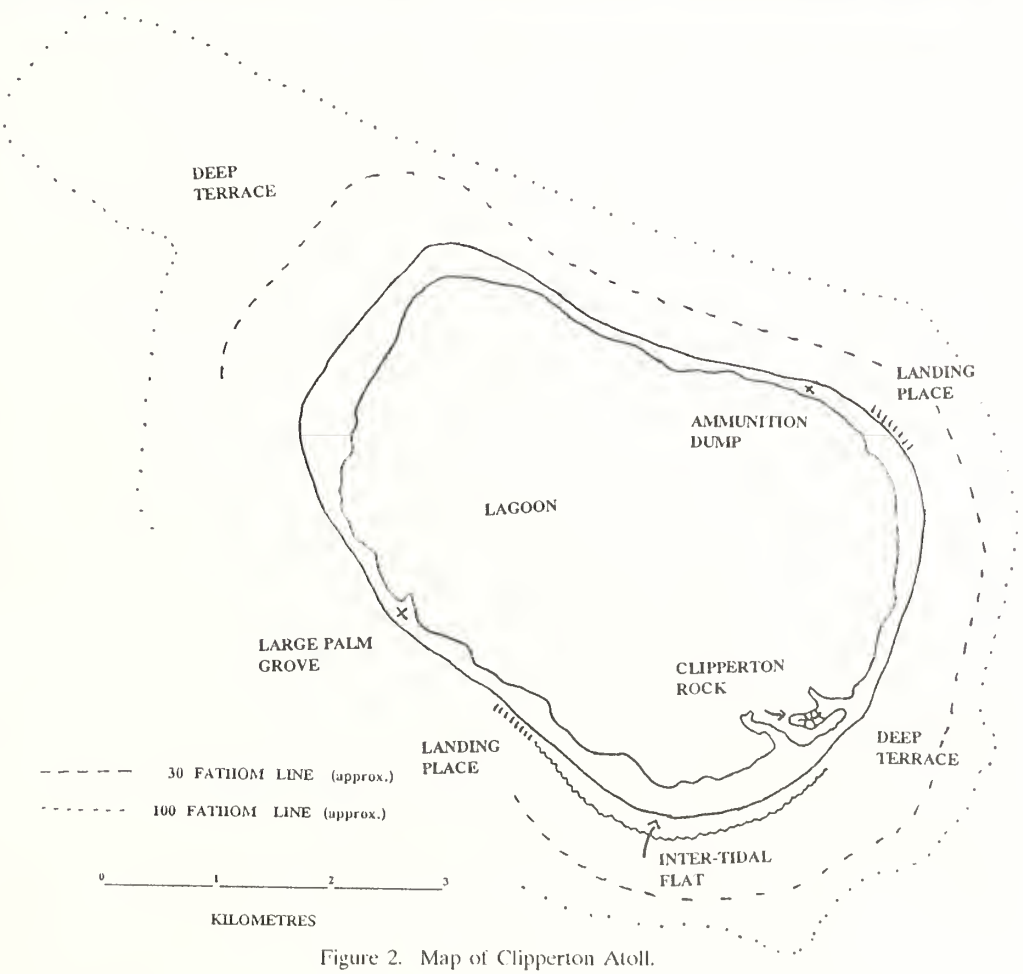

Figure 2. Map of Clipperton Atoll.

hour on our last morning at Clipperton snorkelling over the intertidal flat collecting small cones, being tossed constantly forward and back by the surf while being dragged rapidly along the shore by a strong current.

What did we find when we were finally able to jump in the water? Our first discovery was that Clipperton is a mature coral atoll, with by far the most complete coverage of living coral of any site in the tropical eastern Pacific. The structure of the reefs is similar all the way around the island. There are only a few narrow intertidal flats on the southern and eastern sides of the island; elsewhere the surf breaks right along the shore line. Beyond the surf line, there is a shallow terrace usually 100 yards wide descending from 10 to 50 feet, covered with living and dead coral heads, with the percentage of living coral increasing at the edge of the terrace, around 40-50 feet. At this point, a steep reef slope begins covered in coral with small rubble patches, descending to a deeper terrace at about 160-180 feet. Beyond the deep terrace, the island drops off sharply to over 100 fathoms, often within 300 yards of the shore.

The reefs around Clipperton have a high density of living coral and small reef fish (Figure 3) and they reminded me more of diving on the reefs of the Caribbean than anywhere I have seen in the eastern Pacific. While the coral experts on board found patches of dead coral that were probably killed by increased water temperature during recent El Niño events, the mortality rate appears far lower than other coral reefs that have been surveyed in Panama and the Galápagos. The visibility was good - frequently over 100 feet - and the water wonderfully warm - around 84 degrees F. Overall, Clipperton is a very enjoyable place to dive.

Figure 3. The reef around Clipperton Island. Photo from a color slide taken by Richard Herrmann.

However, it became readily apparent by the second day of our stay that species diversity on the reefs is extremely poor. Peter Glynn and Charlie Veron thought they might find 15 coral species, including a number of Indo-Pacific species not recorded from the mainland of Central America. Instead they could find only about seven coral species, all of which are well known from Central America. Three species of *Pocillopora*, *Pavona* and *Porites* respectively dominate the reefs of Clipperton. Gerry Allen anticipated that the total number of fish species at Clipperton would range from a low of 100 to a high of 200 species. Instead, 13 days of intensive diving only yielded 90 species of fish, of which five (or possibly six) are endemic. Bob Van Syoc found only one barnacle species at Clipperton, an endemic, compared to the three dozen or so species he normally encounters diving on the mainland in Mexico, and only one starfish (apart from a lone sighting of one *Acanthaster* in deep water on the final day).

The same pattern applied to the molluscs. Our provisional species list numbered only 48 by the end of the trip - 8 bivalves and 40 gastropods - in other words only half the number of species that have been recorded from Clipperton, according to Emerson. We found no strombs, olives, marginellas, or cancellarids, and apart from one very dead possible *Hexaplex princeps*, no species of Muricinae. There also appear to be no ovulids since there are virtually no gorgonians on the reefs for them to feed upon.

Other major families are represented by only one or two species - and frequently only by Indo-Pacific taxa. There was only one terebra - the Indo-Pacific species *Terebra crenulata* - and the specimens we found were very small, pale and fairly scarce. Two Indo-Pacific mitres were fairly common - *Mitra ferruginea* and *Mitra papalis* - while the two Panamic mitres recorded from Clipperton, *Mitra*

effusa and *Mitra rupicola (= M. lignaria)* were nowhere to be found. Two bursas from the Indo-Pacific were abundant - *Bursa asperimma* and *Bursa granularis*. We found only a few small living specimens of one Panamic *Cymatium pileare macrodon* and one dead *Cymatium nicobaricum* which is circumtropical. Two Indo-Pacific species of Thaididae covered the dead coral heads - *Morula uva* and *Drupa ricinus* - the latter ranging from the intertidal zone down to 20 metres - a far greater vertical range than where it is normally found in the Indo-Pacific. We found no living specimens of the four Panamic thaids recorded from Clipperton - *Plicopurpura patula pansa*, *Stramonita haemostoma (= Thais biserialis), Thais speciosa* and *T. planospira* - and only a few very dead beach specimens of the latter. Two Indo-Pacific coralliophilas are common on the living coral heads - *Coralliophila violacea* and *Reliquaecava robillardi*. The only large bivalve we frequently found were small specimens of an Indo-Pacific *Spondylus* (species not yet identified).

Cones and cowries were a bit better balanced in terms of the distribution of Indo-Pacific and Panamic species. Among the cones, we found six species - *Conus diadema, C. tiaratus, C. nux,* and *C. purpurascens* which are Panamic, plus two Indo-Pacific species - *C. ebraeus* and *C. chaldeus* that have also been recorded from Isla del Coco, Panama, and Costa Rica. All of these were common to abundant on the reef in from 20 to 50 feet of water (with the exception of *C. nux* which I only found in any numbers when snorkelling in the inter-tidal zone). Colonies of large *C. purpurascens* (60 mm plus), clustered next to their pink egg sacks, were found everywhere under the larger coral pieces on the reef. I discovered one of these colonies under a rock with no less than thirty specimens.

As for the cowries, although 11 species have been recorded from Clipperton, we only found living specimens of three species - *Cypraea isabellamexicana* and *C. albuginosa* from the Panamic, and the Indo-Pacific migrant *C. alisonae*, which has also established itself at Isla del Coco and in the Golfo de Chiriquí in Panama. Of these three, *C. alisonae* were the most common, frequently found roosting on eggs and in breeding pairs; followed by *C. isabellamexicana* and, less frequently, *C. albuginosa*. As for the eight other Indo-Pacific cowry species known from Clipperton, we found only dead specimens of three species: *C. scurra, C. moneta* and *C. helvola*. This suggests that while these three species arrived during earlier El Niño events, none of them have established viable breeding populations.

Perhaps the most interesting discovery was *Harpa gracilis*, the smallest of the Indo-Pacific harps. Apart from Clipperton, where it had been recorded before, *H. gracilis* is known only from the Line Islands and the Tuamotus in the south-eastern Pacific (Walls, 1980). We found no live specimens - probably because we did little night diving over the sand patches in the reef where they normally live, but we found about six dead specimens in sand pockets under coral rubble on the reef slope, including a relatively large (30 mm plus) fresh dead specimen collected by Kirstie Kaiser.

Overall, 49% of the species we found were Indo-Pacific, versus 34% Panamic - a heavier weighting of Indo-Pacific species than has been recorded by past collecting at Clipperton, according to Emerson's list. However, these percentages are at this point provisional.

What accounts for this depauperate fauna? Undoubtedly Clipperton's small size -- only four square kilometres -- significantly restricts the number of species that it can support. Its remote location must also reduce the number of species that are able to migrate there from the mainland of Central America, or from the central Pacific. There are at least two questions about the distribution of molluse species at Clipperton which would merit further study. First, why have some Indo-Pacific migrants apparently boomed and then died off? For example, the 1958 **Doldrums Expedition** found *Cypraea moneta* and *C. caputserpentis* to be abundant in the intertidal zone while we found no living specimens of either species. Second, why are some species abundant there -- such as *Bursa granularis* and *B. asperimma* -- while other related species such as *Cymatium pileare macrodon*, are currently very scarce?

The same distribution of species is evident in other forms of marine life. Among reef fish, for example, Clipperton appears to have only two damselfish, both endemic - one of which covers the reef at depths from 10 feet down to 160 feet, and a second undescribed species, which was discovered during our last day of diving by Gerry Allen and Ross Robertson, living at 160 feet. Meanwhile,

Sergeant-Major damselfish are nowhere to be found - making Clipperton the first place according to Gerry Allen that he has ever dived in the eastern or western Pacific without finding a representative of that genus.

After thirteen days and more than 200 dives by five experienced collectors, I believe our group carried out a fairly comprehensive survey of the molluscs currently living in the reef shallows and reef slopes around Clipperton - i.e. in depths from 10 - 60 feet. On occasion we dove deeper down the reef slope, as deep as 160 feet at various points around the island. However, apart from one very dead *Cypraecassis tenuis* the rubble on the steep reef slope did not yield any species that we did not also find at shallower depths.

We did relatively little collecting in the intertidal area, since it had been well covered by previous expeditions. However, after future El Niño events, there may well be a return of the *Cypraea moneta* and *C. caputserpentis* that the 1958 **Doldrums Expedition** found to be abundant in the intertidal zone.

Night diving over the few patches of fine white "powder" sand that exist around the island - primarily on the northwestern side - might well yield a few more sand dwelling species than we found. We did no night diving over these sand patches, since the swells made it difficult to anchor on that side of the island. But a careful survey in daytime only revealed a few dead *Terebra crenulata* in these patches, and the poison station carried out in one sand patch by our two fish experts did not flush out any other mollusc species.

The most likely environment for new records for Clipperton is the deep terrace, at about 160 - 180 feet that extends around three quarters of the island, on all but the southern side. From the few glimpses various divers had of the terrace, it appears to have a sandy base and is covered with coral rubble. As far we could tell through fathometer readings gathered by Peter Glynn while making transects, this terrace is fairly narrow - maybe about 100 yards - or as wide as the shallow reef top terrace at 10 - 60 feet deep where we normally dove on around the island. In one area - on the northwestern side - the terrace seems much wider, up to half a mile, but also deeper - extending down to 300 feet.

We made a couple of attempts to collect samples from this terrace. The results were not encouraging. Our first attempt was by deploying a tangle net on the eastern side of the island. However, deep water currents tore away about 80 percent of the net, which yielded only a few pieces of dead coral. A few mornings later, we made two attempts to dredge the wider terrace on the northwestern side. However, we were working at the practical limit of effective dredging depth for the equipment we had available, with the dredge 300 feet down and at the end of all 1000 feet of line that we had brought. This made it very difficult to tell whether the dredge was in fact dragging the bottom - or worse, whether it was caught on a piece of rubble, risking losing it altogether. At the same time, the rising swell even at 08:00 in the morning made it difficult to spot the rubber inner tube that lifts the dredge, once all 1000 feet of line were extended. After a couple of unproductive hauls, we packed in the dredging for the remainder of our trip. Heavier dredging equipment and calmer weather might well produce better results. Nevertheless, dredging offshore from a steep coral atoll is a difficult exercise at the best of times.

Clipperton is a weird and intriguing place. I doubt I will ever dive again in such a remote and inaccessible location - and the fascination of our expedition lay in being the first to discover what was there - or not there - beneath the ocean around the island. As an amateur in the field of marine biology, it was a pleasure to spend a month in the company of a distinguished group of experts, from such a variety of disciplines. I would like to thank all the other participants on the trip for freely sharing their knowledge, interests and discoveries with me and the other members of our group. I would also like to thank John Jackson in particular for his meticulous planning that made Clipperton '94 such a success.

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UNUSUAL BIVALVE FINDS FROM SAN MIGUEL ISLAND, CALIFORNIA

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In October 1993 Adrian Valli, then a member of the San Diego Shell Club, participated in a dive trip to San Miguel Island, California. While diving off Talcott Shoals at a depth of 18 m (60 ft), Adrian found some interesting bivalve specimens. These were newly dead in a broken shell substrate in sand channels between rock reefs. The first species, shown in Figures 1 & 2, was named by Dall (1916) as *Glycymeris migueliana*, and San Miguel Island is the type locality for this species. Dall (1916) described the shell as "solid, white with sparse zigzag lines of reddish brown and internally often with a touch of brown near the posterior margin; surface smooth except for irregularities of growth; valves suborbicular, anterior side slightly longer, posterior hardly produced; beaks low, area small and divarically grooved; inner basal margin crenulated; anterior teeth 10-14, posterior 9-12; valves moderately convex. Length, 23; height, 22; diameter, 14 mm. Cat. No. 120775,

Figure 1. *Glycymeris septentrionalis* (Middendorf, 1849) form *migueliana* Dall, 1916, collected off San Miguel Island. Photo: David K. Mulliner.

Figure 2. *G. septentrionalis*, magnified view of external surface of shell shown in Figure 1. Photo: David K. Mulliner.

U.S.N.M." The type of *G. migueliana* was figured by Willett (1944). Powell (1992) stated that *G. migueliana* was a synonym of *G. septentrionalis* (Middendorff, 1849). Willett (1944) reprinted Middendorff's figure of the type of *G. septentrionalis.* Powell listed other synonyms of *G. septentrionalis* as *G. barbarensis* of authors, not of Conrad (1857); *G. corteziana* Dall, 1916; *G. guadalupensis* Strong, 1938; *G. profunda* (Dall, 1878); and *G. subobsoleta* (Carpenter, 1864). Based on the large number of synonyms, *G. septentrionalis* is a very variable species. Powell stated that *G. septentrionalis* "specimens from a single locality show a narrow range of variability in the shell outline, the size and shape of the hinge, and the thickness of the shell, but over the geographic range of the species all shell features vary considerably. This species ranges geographically from the type locality at Chirkof Island (56°N) in the western Gulf of Alaska southward to Rocas Alijos (25°N), Baja California Sur, Mexico, and has been reported from faunas as old as Miocene." Coan (1993, pers. comm.) questioned Powell's statement about the narrow range of variability of *Glycymeris* at a single locality, since Coan found a large range of variability when he collected at Rocas Alijos. Although Dall (1916) described the surface of *G. migueliana* as smooth except for growth irregularities, the specimen figured here has intersecting incised radial and concentric lines which result in parallel rows of raised sculpture. The specimen figured here is the *migueliana* form of *G. septentrionalis.* It is slightly larger than the holotype of *G. migueliana*, having the following dimensions: length, 24.3; height, 23.0; diameter, 15.3 mm. It has 9 anterior teeth and 7 posterior teeth. It has extensive chevron patterning rather than the sparse zigzag lines described by Dall. Although *G. migueliana* is considered a synonym of *G. septentionalis* by Powell, comparison of the figures of the type species show the two look vastly different.

The second species found was *Gari (Gobraeus) fucata* (Hinds, 1845) = *G. (G.) edentula* (Gabb, 1869) (pers. comm. Paul Scott). A single, newly-dead specimen was found, and had the following dimensions: length, 31.8; height, 15.9 mm. The specimen is shown in Figure 3. Coan (1973)

Figure 3. *Gari (Gobraeus) fucata* (Hinds, 1845), collected off San Miguel Island. Photo: David K. Mulliner.

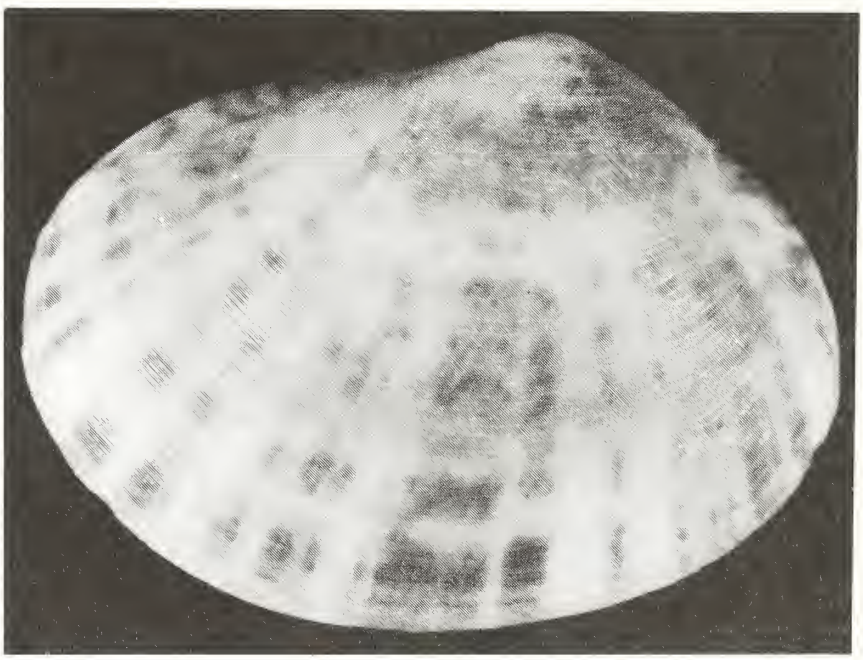

Figure 4. *Semele (Amphidesma) venusta* (Reeve, 1853, ex A. Adams, MS), collected off San Miguel Island. Photo: David K. Mulliner.

reviewed the northwest American Psammobiidae and stated that this species gets to 140 mm in length. Therefore, the specimen figured here is obviously juvenile.

The third species found was *Semele (Amphidesma) venusta* (Reeve, 1853, *ex* A. Adams MS). The single specimen found is shown in Figure 4. Its dimensions are: length, 19.1; height 15.9 mm. Coan (1988) synonymized *Semele incongrua* Carpenter, 1864 (type locality: Catalina Island, California) and *Semele pulchra* "*var.*" *montereyi* Arnold, 1903 (type locality: Pleistocene, Deadman Island, San Pedro, Los Angeles Co., California) with *S. venusta* (type locality: Manta, Manabí Prov., Ecuador). Coan states that this species gets to 27.8 mm. The specimen figured here is very colorful externally, having most of its surface varying shades of purple and rose.

The specimens discussed are in the Adrian Valli collection. Hopefully, the report of these findings will induce more of the members of the San Diego Shell Club to look for bivalves on their next dive trip to San Miguel Island.

The author is indebted to Paul Scott for his suggestions and to Eugene Coan for a critical reading of the paper.

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SHELLFISH INFORMATION LINE NOW AVAILABLE

The **Sea Grant Extension Program Newsletter** announces that since May 1, 1994, the California Department of Health Services, Environmental Management Branch provides recorded updates on marine toxin activity and special quarantines or public warnings in California. The toll-free number is 1-800-540-2605. Callers may leave a message at the toll-free number to request more detailed information.

For copies of the annual reports on the shellfish monitoring program, write to:

California Department of Health Services
Environmental Management Branch
P.O. Box 942732
601 North 7th Street, MS-396
Sacramento, CA 94234-7320

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Clipperton '94 -- The Adventure!

Richard Herrmann and Charlie Waters, two members of the recent Clipperton '94 Expedition, will give a team slide program on their adventure. They will also have a display. This multidisciplinary expedition was the first full scientific expedition there since the 1958 **Doldrums Expedition.**

Meeting date: August 18, 1994
Shells of the month: Shells of offshore islands

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - July 21, 1994

At 7:40 p.m. the meeting was called to order by President Hugh Bradner. Minutes of the May meeting were approved as published in **The Festivus** and guests and new members were introduced.

Hugh reminded the members that the September party, with Greek theme, will be held at their home on Saturday evening, September 24th. A food signup sheet was circulated so that members could decide on their potluck contribution. Recipes for the main dish and salad are available from Marge Bradner. For further information or a copy of the recipes, contact Marge Bradner 459-7681. Further details and a map with directions to the Bradner home will be in the September issue of **The Festivus**.

The Bradners and Romers were thanked for providing the evening's refreshments. The shell drawing was then held and was won by Margaret Mulliner.

Dave Mulliner announced that the San Diego Underwater Film Festival's "Dive into the Future" will be held on Friday and Saturday evenings September 16th and 17th. The Master of Ceremonies this year will be Ron McPeak.

Billee Brown announced that she is offering her shell display cocktail table for sale with the proceeds to go the Club. For details see column 2, this page.

George Kennedy shared information on standard sieves which was of considerable interest to those who collect micromollusks. He had also made copies of illustrated price lists available.

Carole Hertz announced the four new books purchased by librarian Margaret Mulliner, which are now available for circulation (see page 94).

Larry Buck then introduced the evening's speaker, Club member John Michel, who was the leading engineer aboard the bathyscaph **Trieste** from 1959 to 1962. John presented a most informative (and often humorous) slide presentation on his experiences topside and underwater on this unique submersible that still holds the record for the deepest dives down to 35,000 feet in the Challenger Deep off Guam. John explained the workings and failures of the five separate vehicles and contrasted the principles behind the bathyscaph with the workings of hot air balloons. There was much interest in his talk and the many questions from the audience kept John busy when his presentation was over.

The Club Science Fair winner, James Sullivan Gibilisco, was then introduced and given his award: Morris, Abbott and Haderlie's, **Intertidal Invertebrates of California**. He will present an overview of his project at the August meeting.

Following the program the members enjoyed the refreshments and the opportunity to socialize.

Addition to the Roster

New Member

Smith, John, 2220 C Street, #109, San Diego, CA 92102, (619) 232-5645.

Change of Address

Shasky, Donald, 4990 Nighthawk Way, Oceanside, CA 92056, (619) 941-4532.

Sale of Cocktail Table to Benefit Club

Member Billee Brown is interested in selling her plate glass-topped cocktail table for displaying shells. She has generously designated that the proceeds from the sale go to the Club.

The table is oak with a walnut stain and measures 5 feet in length, 22 inches wide and 13 inches in height. The inside display area is 4 inches deep and includes the white sand backdrop for the shells. If you are interested in buying the table and want to see it or get further information, contact Billee at 454-5788.

For those interested, send a sealed bid to the Club address (front page) by September 1st. The treasurer will open the bids at that time and the highest bidder will get the table.

THE CAECIDAE OF SAN FELIPE AND ENVIRONS, GULF OF CALIFORNIA, FROM THE GEMMELL COLLECTION (1965-1976)

CAROLE M. HERTZ*, BARBARA W. MYERS* & JOYCE GEMMELL**

*Santa Barbara Museum of Natural History, 2559 Puesta del Sol Road, Santa Barbara, California 93105
**150 South Anza, Space 47C, El Cajon, California 92020

Abstract: Six species of Caecidae in four genera are identified in the Gemmell collection from the San Felipe area three of which -- [*Caecum clathratum* Carpenter, 1857, *Fartulum limnetes* (Long, 1972), and *Fartulum glabriforme* (Carpenter, 1857)]--have not previously been reported at San Felipe or on the Baja California side of the northern Gulf of California. A seventh species, *Elephantulum liratocinctum* (Carpenter, 1857), previously reported from San Felipe in seastar stomachs (Gemmell, Myers & Hertz, 1980), is also discussed.

Little work had been published on the Recent Caecidae in the Panamic Province since Keen (1971) and Draper (1979) until the papers by Lightfoot (1993a,b). Skoglund (1992) references the changes since Keen (1971). Gemmell, Myers & Hertz (1980) reported the species *Elephantulum liratocinctum* (Carpenter, 1857), from seastar stomachs dredged off San Felipe. As part of our continuing study of the mollusks from the Gemmell collection, we here report six additional species of Caecidae from the San Felipe area, three of which are new distributional records. Gemmell, Myers & Hertz (1987) provide maps of the area discussed. The identifications of the species were confirmed by the late Joanne Lightfoot and compared, where possible, with specimens in the Carol Skoglund collection, Phoenix, Arizona.

We appreciate the scope of the study of the Caecidae by Lightfoot (1992a-c; 1993a,b), but we are not in agreement with her usage of the genus *Brochina* Gray, 1857. *Brochina* was erected primarily on the basis of its convex operculum. The type species, *Dentalium glabrum* Montagu, 1803:497, from the Atlantic coast of Europe, has the convex operculum like "an inverted teacup without a handle" (Jeffreys, 1867:78; 1869, pl. 70, fig. 5) and was described as having a septum "rounded and subemarginated." Van Aartsen (1977, figs. 5, 14) in his study of Atlantic and Mediterranean caecids, illustrated a specimen of *Caecum glabrum* and detail of its septum, showing "a hemispherical dome with no signs of projections or appendices." Lightfoot (1992a,b) expanded the concept of *Brochina* and considered it a subgenus of *Caecum* having a septum with a "coin edge mucro" with a variable projection.

Lightfoot (1993b) raised *Brochina* to a genus. The operculum was not studied in any of the Lightfoot papers. Because *C. glabrum*, the type species of *Brochina*, has no projection on the septum and has a convex operculum, we have not adopted Lightfoot's new placement here.

Following is an illustrated listing of the seven species arranged alphabetically by genus. All species are drawn, some in several views, by Gemmell from the material in her collection. An asterisk next to a species name indicates an extension of the known distribution. In cases where specimens are listed with a "G" number, the reference is to a number cited in Gemmell, Myers & Hertz (1980).

All specimens are currently housed in the San Diego Natural History Museum (in the office of the Department of Entomology).

Family CAECIDAE
Genus *Caecum* Fleming, 1813

**Caecum clathratum* Carpenter, 1857
(Figure 1a-c)

Cat. Coll. Mazatlan Shells in Brit. Mus., p. 322
Fig'd.: Brann (1966, pl. 34, fig. 369)

20 spec., 1.2-2.7 mm L[+], Pta. Estrella, San Felipe, in grunge, May 1968
1 spec., 2.0 mm L, Playa Laguna, San Felipe, crabbed, at minus tide on hydroid
2 spec., 2.2 & 2.8 mm L, Puertecitos, in sand, July, 1969
7 spec., 1.5-2.6 mm L, Puertecitos, in intertidal grunge, February 1971
1 spec., 1.9 mm L, 8.0 km (5 mi) S of Puertecitos, in intertidal grunge
12 spec., 1.7-2.3 mm L, dredged by fishing boat **Chamizal II**, west of Isla Salvatierra [a.k.a. Isla San Luis] (29°57'48"N, 114°28'W), 0.8 km (½ mi.) offshore, in sand, July 1969
1 spec., 1.4 mm L, Bahía Willard, San Luis Gonzaga, 1969

Remarks: This species is extremely close in sculpture to *C. bahiahondaense* Strong & Hertlein, 1939, which may prove to be a synonym. Note the rounded cords.

Distribution: Keen (1971) listed the distribution as Mazatlán, Sinaloa, to Islas Tres Marias, Nayarit, Mexico. DuShane & Poorman (1967) extended the range N to the area of Guaymas, Sonora; J. & C. Hertz (1978) noted it at La Paz, Baja California Sur, Mexico, and Shasky (1984) extended the distribution S to Manabí Province, Ecuador. Lightfoot (1993a) studied specimens from San Juanico (Baja California Sur), Puerto Peñasco and Estero Morua (Sonora), and Ixtapa (Guerrero), all in Mexico; Puntarenas and Peninsula de Nicoya, Costa Rica; and Venado Beach, Canal Zone, Panama. This is the first record of the species at San Felipe, Puertecitos, and Bahía San Luis Gonzaga.

Caecum quadratum Carpenter, 1857
(Figure 2)

Cat. Coll. Mazatlan Shells in Brit. Mus., pp. 322-323
Fig'd.: Brann (1966, pl. 34, fig. 370 & pl. 35, fig. 371)

[+] L indicates length

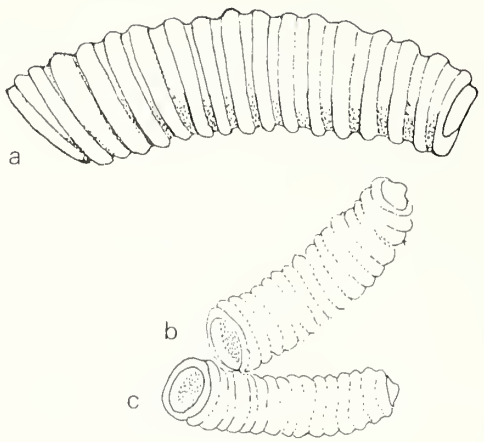

Figure 1a-c. *Caecum clathratum* (a) 2.7 mm L, from a lot of 20 specimens, 1.2-2.7 mm L, in grunge from off Pta. Estrella, May 1968.

1 spec., 2.2 mm L, Pta. Estrella, in grunge, May 1968
3 spec., 1.3-2.0 mm L, Playa Laguna, crabbed at minus tide on hydroid
7 spec., 1.2-1.6 mm L, Ensenada Blanca, San Felipe, on white hydroid, June 28, 1968
5 spec., 1.5-2.0 mm L, Puertecitos, November 1968
2 spec., 1.8-2.2 mm L, Puertecitos, in intertidal grunge, February 1971
3 spec., 1.6 mm L, 8.0 km S of Puertecitos, in intertidal grunge
32 spec., 1.2-2.6 mm L, dredged by fishing boat **Chamizal II**, off Isla Salvatierra, 0.8 km offshore (29°57'48"N, 114°28'W), in sand, July 1969

Remarks: Note that the cords are flattened, not rounded as in *C. clathratum*. Abbott (1974) considered the Californian *C. grippi, C. licalum* and *C. diegense* to be synonymous with *C. dalli* all of Bartsch, 1920. Lightfoot (1993a) added *C. richthofeni* Strong & Hertlein, 1939, to the Bartsch species and placed them all in the synonymy of *C. quadratum*. We have not examined comparative material of these species.

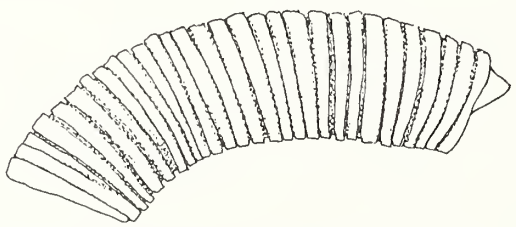

Figure 2. *Caecum quadratum*, from a lot of 32 specimens, 1.2-2.6 mm L, taken off Isla Salvatierra, July 1969.

Distribution: Described from Mazatlán, Sinaloa, Mexico. J. Hertz (1979) extended the distribution to San Felipe; Poorman & Poorman (1988) listed the species from Bahía San Carlos, Sonora. Lightfoot (1993a) examined specimens ranging from San Pedro, Los Angeles County, California, to Puerto Peñasco, Sonora, in the upper Gulf of California, and S to Panama.

Genus *Elephantulum* Carpenter, 1857

Elephantulum heptagonum Carpenter, 1857
(Figure 3a-d)

Cat. Coll. Mazatlan Shells in Brit. Mus., p. 319
Fig'd.: Brann (1966, pl. 32, fig. 365)

4 spec., 2.0-2.5 mm L, dredged by fishing boat **Chamizal II**, W of Isla Salvatierra, San Luis Gonzaga, October 1969

11 spec., 1.2-2.2 mm L, N side of Bahía Willard, San Luis Gonzaga, November 28, 1969

3 spec. + 1 fragment, 1.7-2.2 mm L, dredged by fishing boat **Chamizal II**, Bahía San Luis Gonzaga in fine sand, July 8-10, 1969

Distribution: Keen (1971) listed the distribution from Bahía San Luis Gonzaga to Panama. DuShane & Sphon (1968) noted the species from Bahía Willard. Lightfoot (1993a) studied specimens from several Mexican localities: San Juanico, Baja California Sur; Puerto Peñasco and Bahía Bacochibampo, Sonora; Bahía Banderas, Jalisco; and Ixtapa, Guerrero.

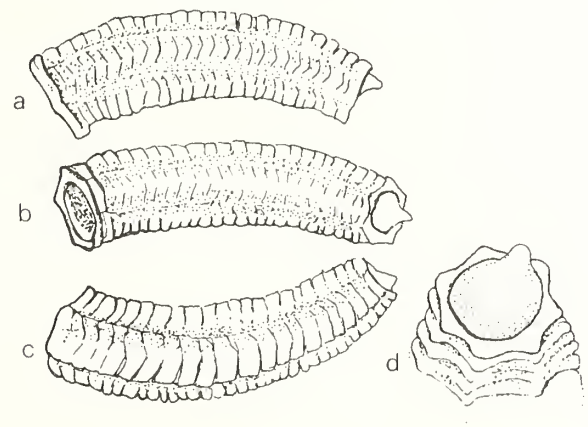

Figure 3a-d. *Elephantulum heptagonum*, from a lot of 11 specimens, 1.2-2.2 mm L, taken in intertidal grunge at Bahía Willard, November 28, 1969. (a-c) 3 views (d) detail of plug showing projection on right side.

Elephantulum liratocinctum Carpenter, 1857
(Figure 4a-d)

Cat. Coll. Mazatlan Shells in Brit. Mus., pp. 317-318
Fig'd.: Brann (1966, pl. 33, fig. 364)

Synonyms:

C. liratocinctum tenuiliratum Carpenter, 1857, fig. 364 [tab. 1520]

C. l. subobsoletum Carpenter, 1857, fig. 364 [tab. 1521]

C. l. subconicum Carpenter, 1857, fig. 364 [tab. 1522]

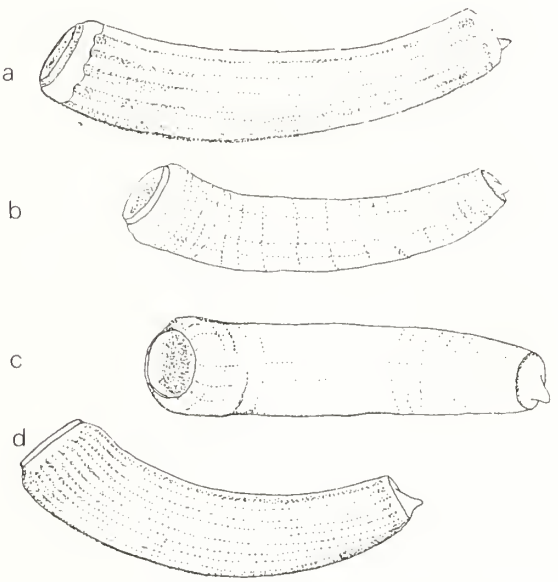

Figure 4a-d. *Elephantulum liratocinctum* (ex G-42AS), a lot of 79 specimens, 3.0-4.8 mm L, from off Pta. Estrella, Bahía San Felipe from seastar stomachs. The four specimens are shown to highlight the variability of the species.

79 spec., (ex G-42AS) 3.0-4.8 mm L, dredged by fishing boat **Chamizal** off Pta. Estrella, Bahía San Felipe, (31°20'18"N to 30°41'N and 114°17'36"W to 114°48'W), from seastar stomachs, June 27-29, 1968

1 spec., 3.4 mm L, Playa Laguna, San Felipe, crabbed, on hydroid on minus tide

9 spec., 3.0-4.0 mm L, Radar Beach, San Felipe, in grunge, February 1971

34 spec., 2.3-3.6 mm L, Puertecitos, in intertidal grunge, February 1971

1 spec., 3.4 mm L, Playa Alicia, in grunge, April 12-13, 1972

15 spec., 2.4-4.1 mm L, Ensenada Blanca, San Felipe, on white hydroid, June 28, 1968
1 spec., 3.4 mm L, 8.0 km S of Puertecitos in intertidal grunge, March, 1975
39 spec., 2.5-4.5 mm L, Puertecitos, in drift, November 1968
190 spec., (ex G-42A), 2.5-4.5 mm L [1 vial with 16 spec., live taken with opercula; 1 vial with juveniles] dredged by fishing boat **Chamizal II** from Puertecitos to San Luis Gonzaga (29°57'48"N to 30°94'30"N and 114°28'W to 114°33'42"W), July 1969
9 spec., 3.3-4.7 mm L, Bahía Willard, San Luis Gonzaga, in beach grunge, November 28, 1969

Remarks: The figures from Brann (1966) include the "varieties" which Keen (1968:419) stated "might be within the range of variation of the species...." These "varieties" were synonymized by Lightfoot (1993a), and we concur.

Distribution: Keen (1971) listed the range as Bahía San Luis Gonzaga to Panama. Gemmell, Hertz & Myers (1980) extended the distribution to San Felipe. Lightfoot (1993a) extended it N to Puerto Peñasco, Sonora.

Genus *Fartulum* Carpenter, 1857

Fartulum dextroversum (Carpenter, 1857)
(Figure 5a-d)

Cat. Coll. Mazatlan Shells in Brit. Mus., p. 328
Fig'd.: Brann (1966, pl. 37, fig. 376)

2 spec., 1.5 & 1.6 mm L (with periostracum), Ensenada Blanca, San Felipe, on hydroid, June 28, 1968
1 spec., 4.2 mm, Puertecitos, east side of bay
1 spec., 1.8 mm, 8.0 km S of Puertecitos, in grunge, March 1975
6 spec., 2.0-3.4 mm L, dredged by fishing boat **Chamizal II**, W of Isla Salvatierra, 0.8 km offshore (29°57'48"N, 114° 28'W), in 25.6 m, in sand and pumice, July 8-10, 1969

Remarks: Abbott (1974) placed the Californian *Fartulum hemphilli* and *F. bakeri,* in the synonymy of *F. occidentale* (all of Bartsch, 1920). Lightfoot (1993b) placed these species in the synonymy of *F. dextroversum*. We have not examined the Californian comparative material of these nominal taxa.

Distribution: The species was described from Mazatlán. J. Hertz (1979b) listed and figured the species from Puertecitos to San Luis Gonzaga as *F. ?dextroversum*. Shasky (1984) noted the species from Manabí Province, Ecuador. Lightfoot (1993b) gave the distribution as Santa Barbara, California, to the northern Gulf of California at Puerto Peñasco and S to Bahía Banderas, Nayarit.

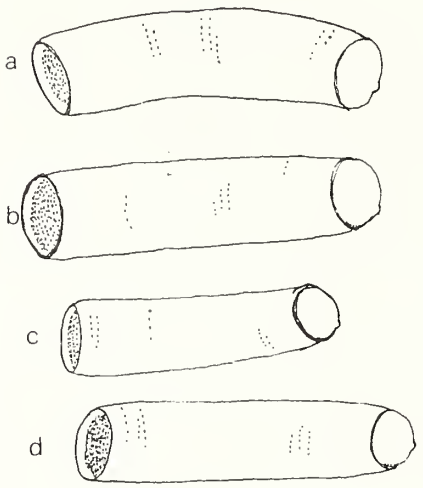

Figure 5a-d. *Fartulum dextroversum*, from a lot of six specimens, 2.0-3.4 mm L, from W of Isla Salvatierra, July 8-10, 1969. Views of four specimens. Note small "pimple" on right side of plug.

**Fartulum glabriforme* (Carpenter, 1857)
(Figure 6a-e)

Cat. Coll. Mazatlan Shells in Brit. Mus., p. 327
Fig'd.: Brann (1966, pl. 37, fig. 374)

10 spec., 1.5-2.2 mm L, Ensenada Blanca, San Felipe, on white hydroid, June 28, 1968
3 spec., each 3.0 mm L, Playa Alicia, San Felipe, in grunge, April 12-13, 1972
2 spec., 1.7 & 2.0 mm L, Campo Uno, San Felipe, in grunge, 1971
4 spec., 1.9-2.2 mm L, 8.0 km S of Puertecitos, in intertidal grunge, March 1975
15 spec., 1.6-2.2 mm L, dredged by fishing boat

Chamizal II, W of Isla Salvatierra, 0.8 km offshore (29°57'48"N, 114°28'W), in 25.6 m, in sand and pumice, July 8-10, 1969

Remarks: J. Hertz (1979, fig. 4) listed this species as *Fartulum ?farcimen* (Carpenter, 1857).

Distribution: Described from Mazatlán. J. Hertz (1979:33) listed the species from the **Chamizal II** dredging off Isla Salvatierra. Lightfoot (1993b) studied specimens from Bahía Magdalena, Baja California Sur; Bahía Kino and Bacochibampo, Sonora, Mexico; and Bahía Panama and Venado Beach, Canal Zone, Panama. This is the first record of the species in San Felipe and Puertecitos.

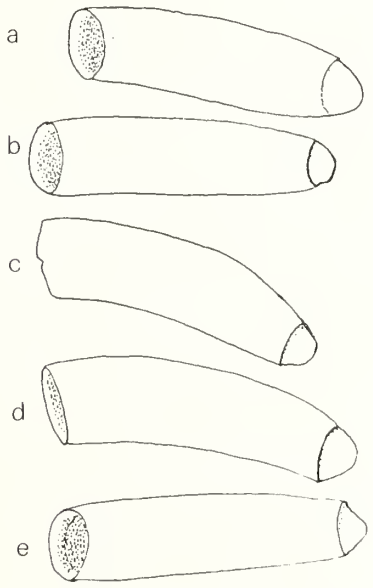

Figure 6a-e. *Fartulum glabriforme*, illustration of five specimens from a lot of 15 specimens, 1.6-2.2 mm L, from W of Isla Salvatierra in 25.6 m, July 8-10, 1969.

**Fartulum limnetes* (Long, 1972)
(Figure 7a-c)
Veliger 14(3):291-292, figs. 1, 2

11 spec., 1.3-2.0 mm L, Ensenada Blanca, San Felipe, on white hydroid, June 26, 1968

1 spec., 1.5 mm L, 8.0 km S of Puertecitos, in grunge, March 1975

7 spec., 1.7-2.0 mm L, dredged by fishing boat **Chamizal II**, W of Isla Salvatierra, 0.8 km offshore (29°57'48"N, 114°28'W), in 25.6 m, in sand and pumice with pectinid valves, July 8-10, 1969

Remarks: Described from Estero Choya [Bahía Choya], Sonora, Mexico. Lightfoot (1993b) studied specimens from other localities in the Puerto Peñasco area. This is the first record of this species outside Sonora. These specimens were compared with Skoglund specimens of *B. limnetes* determined by G. Long.

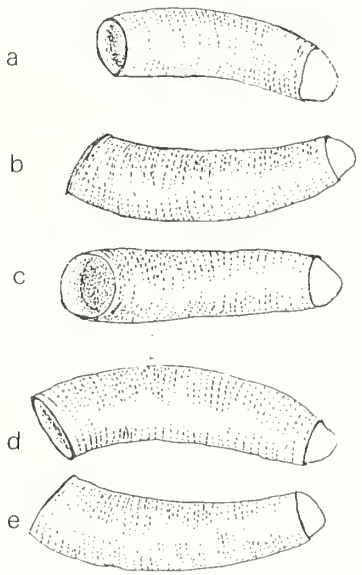

Figure 7a-e. *Fartulum limnetes*, from a lot of seven specimens, 1.7-2.0 mm l, dredged by fishing boat **Chamizal II**, W of Isla Salvatierra, July 8-10, 1969. The rounded cords are close together and not very high.

ACKNOWLEDGMENTS

Our appreciation to the late Joanne Lightfoot who confirmed the identifications of the species and to Carol Skoglund for the loan of study material and for reviewing a draft of the manuscript. The San Diego Natural History Museum gave us office space in the Entomology Department and access to the scientific library, which we appreciate.

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BOOK NEWS

As a result of the generous participation of Club members in the recent book and reprint sales and the "mini auctions" of duplicate library material, the Club has been able to purchase four new books for the library. The four books listed below are valuable additions to the Club's fine circulating library and it is hoped that members will avail themselves of the opportunity to borrow [for one month] these new works.

Bivalved Seashells of the Red Sea
By: P. Graham Oliver, 1992.
Published by: Verlag Christa Hemmen (Wiesbaden) and the National Museum of Wales (Cardiff).
330 pages, 46 color plates, numerous text figures.

European Seashells, Vol. II (Scaphopoda, Bivalvia, Cephalopoda)
By: Guido T. Poppe & Yoshihiro Goto, 1993.
Published by: Verlag Christa Hemmen, Wiesbaden.
221 pages, 31 color plates, 62 text figures.

Ranellidae & Personidae of the World
By: Thomas Henning & Jens Hemmen, 1993.
263 pages, 30 black & white plates.

Trophoninae (Muricidae) of Russian and Adjacent Waters
By: Roman Egorov, 1993.
Ruthenica, Supplement 1, 48+ pages, 39 figures [figures 30-39 as black & white plates].

HUMILARIA KENNERLYI SURVIVES DRILL ATTACK

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I have been intrigued by the Kennerly's Venus clam [*Humilaria kennerlyi* (Reeve, 1863)] for a long time (see Anderson, 1985; 1994). Recently, I found one of these thick-shelled clams that emphasizes its resistance to drilling. I was diving at Titlow Beach in Tacoma (Washington State, USA), a dive site popularized by the world octopus wrestling competitions held there in the 1960s (High, 1963). Although octopus wrestling is now no longer sanctioned or practiced, this site is still popular among divers. There are strong currents that sweep through the Tacoma Narrows, a stricture in Puget Sound, and divers can only dive on slack tides. The currents make for a rich bottom life. The substrate is composed of rock ledges and cobble/gravel. Numerous shells litter the bottom, including many *H. kennerlyi*. I spotted a particularly large shell and stuck it in my pocket.

Upon measuring the shell (103 mm by 77 mm) I noticed that it had an incomplete bore hole in it from a carnivorous gastropod (Figure 1). The cylindrical hole on top of the umbo is 6.0 mm deep and 2.3 mm wide, a remarkable depth for a drill hole. This is more than twice as deep as any drill holes noted by Williams (1976).

There is a thickening of shell material and a discolored area on the inside of the shell under the bore hole. It is not likely the clam could sense where the drill hole would penetrate the shell, therefore the hole must have pierced the shell before the clam could defend against it. After the snail had perforated the shell, the clam must have mounted a defense against it by laying down more shell material under the hole.

The snail must not have been able to complete its drill hole. Perhaps 6.0 mm was as deep as it could drill, or perhaps it became dislodged or "discouraged".

There are only three large snails in this area of southern Puget Sound that could have drilled so large a hole: *Polinices lewisii* (Gould, 1847), *Nucella lamellosa* (Gmelin, 1791), or *Ceratostoma foliatum* (Gmelin, 1791). *Polinices* bore a large beveled hole (MacGinitie & MacGinitie, 1968; Williams, 1976), so it seems likely that this hole was bored by a *N. lamellosa* or a *C. foliatum*.

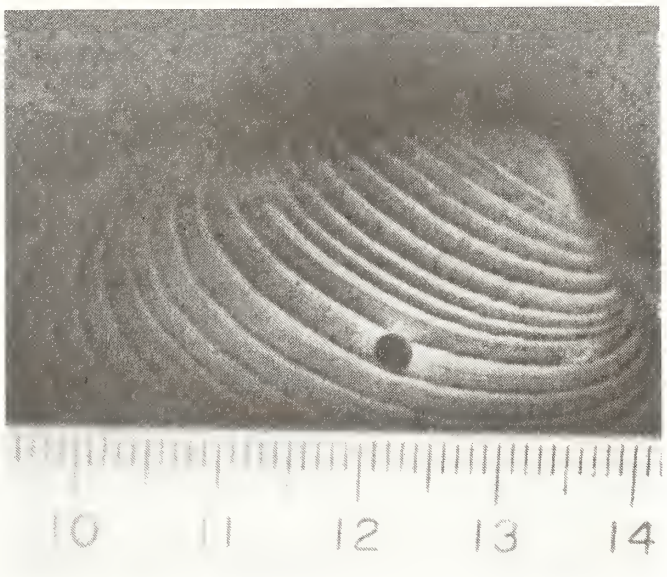

Figure 1. The drill hole into this *Humilaria kennerlyi* shell is 6.0 mm deep. Photo by Leo Shaw, The Seattle Aquarium.

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ANNUAL MEETING OF THE WSM

JULES HERTZ

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The 27th annual meeting of the Western Society of Malacologists was held 26-29 June 1994 at the Miramar Hotel, Santa Barbara, California. There were 73 people in attendance for the three days of papers and social events. It was an extremely interesting meeting in an ideal setting. The hotel has pools, tennis courts, restaurant and snack bar, and just across the adjacent railroad tracks is beautiful Miramar Beach. Early morning strolls along the beach at low tide revealed a number of common Californian gastropod species.

The 26th was a relaxing, get-reaquainted day, and followingregistration the President's reception, with President Kirstie Kaiser welcoming attendees, was held at the Sea Center of the Santa Barbara Museum of Natural History on historic Stearns Wharf.

The technical portion of the meeting started on the 27th with a symposium entitled "Systematics of Micromollusks" convened by James McLean. The most interesting papers for me were: "What is a Micromollusc?" by Anders Warén, "They All Look The Same! - Convergence in Shell Form in Micro-gastropods" by Winston Ponder, and "Progress toward Revision of the Liotiinae and Colloniinae of the World" by James McLean. Those of us who collect micromollusks were totally discouraged by all the examples of shell convergence. It seems that one cannot put a species name on microspecies with any confidence without knowing details of the anatomy, and in the case of eulimids the host species. That afternoon, a "Workshop on Micromollusks" was conducted (Figure 1). Eight microscopes were

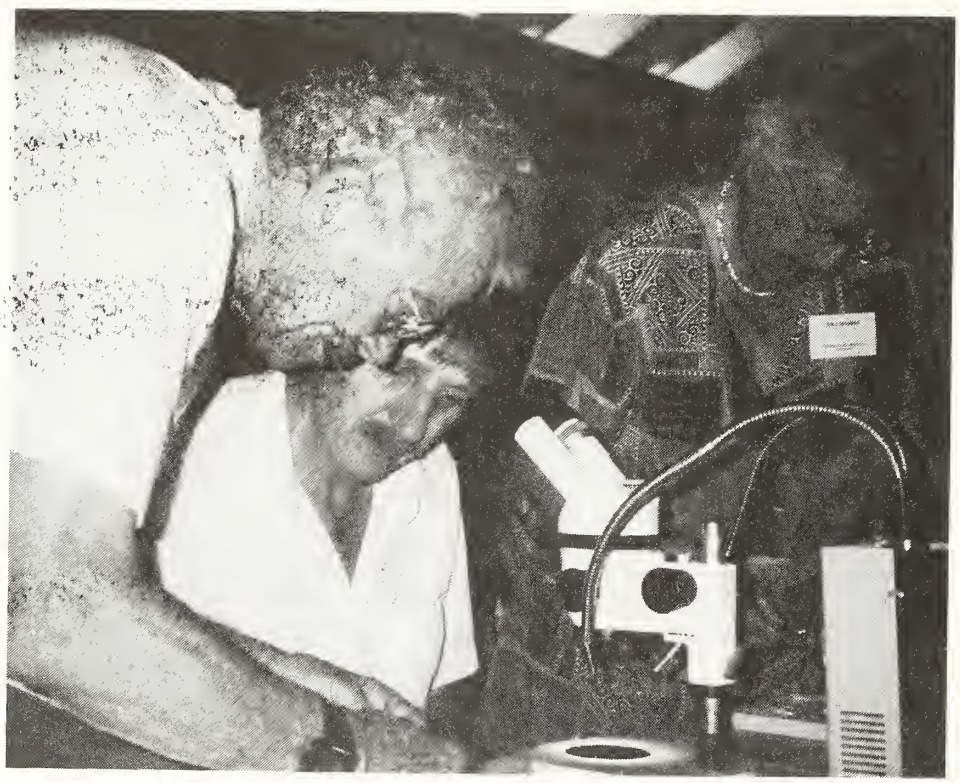

Figure 1. WSM Micromollusk Workshop. Left to right: Don Shasky, Winston Ponder and Carol Skoglund.

available and one could confer with the professional experts on any identification problems. One could also view micromollusks collected by many of the attendees, including some micromollusks recently collected at Clipperton Island. The Workshop proved to be the highlight of the meeting for many of the attendees, and it has been recommended that such workshops be included in future WSM meetings.

On the 28th, the technical program continued with contributed papers on a variety of mollusk related subjects. A Contributed Poster Session was also displayed showing summations of some very fine work (Figure 2). The evening of the 28th started with the annual reprint sale and was followed by the auction (Figure 3). To many of us, the auction is the most fun of all the social events. Once again, Henry Chaney was the auctioneer, and he did a marvelous job of

Figure 2. R. Tucker Abbott and Twila Bratcher-Critchlow in front of posters.

Figure 3. Auction preview. In foreground: Terry Arnold, Lindsey Groves and Carole Hertz.

squeezing money out of those attending. Using humor, threats, cajoling, and a marvelous collection of shells (many from Clipperton Island), Henry made a record amount of money for a WSM auction. Given the available wine, snacks, good humor and good cause many of us had no regrets in over-spending our budgets.

On the last day, the technical program consisted of a symposium on "Current Topics of Biogeography of Mollusks." There was a full day of papers. The most interesting to me was a very fine paper by Alison Kay entitled "Pacific Island Biogeography: Myths of the Past, Visions for the Future" and a paper by Henry Chaney entitled "The Molluscan Fauna of Clipperton Island: A Preliminary Report of the 1994 Clipperton Expedition." The business meeting that afternoon revealed that the 1995 WSM meeting will be held June 2-5, 1994 at Chena Hot Springs, Fairbanks, Alaska. It looks like newly elected President, Nora Foster, has some interesting plans and has been able to make some preliminary arrangements at very reasonable costs. The 1996 meeting is scheduled for San Diego with current 1st vice-president Hugh Bradner responsible for the arrangements.

The last event for this year's WSM meeting was a reception and banquet at the Santa Barbara Museum of Natural History. It started with an open house reception in the Department of Invertebrate Zoology in the Collections and Research Center. This year's meeting honored Dr. William K. Emerson for his many contributions to malacology. While nibbling on marvelous appetizers, we were able to view an exhibit put together by Don Shasky on species named by and for Bill Emerson. Accompanying this beautiful display were copies of the pertinent Emerson papers. Following was a buffet dinner in an outside courtyard which was delightful because of the gourmet food, fine wine, and beautiful intimate surroundings. After dinner, we adjourned to Farrand Hall where the evening festivities continued. Henry Chaney presented a series of slides showing Bill Emerson at most of the previous WSM meetings spanning a period of 26 years. He then presented Bill with a WSM Honorary Membership award which consisted of a plaque with a beautifully mounted piece of coral from Clipperton Island. The final event of the evening was a program by the evening's featured speaker, Terrence Gosliner. His program consisted of film from the early 1930s entitled "Early 20th Century Biological Exploration in the Eastern Pacific: Roughing it Aboard the **Zaca** and **Velero III**."

CAMPUS MARINE SCIENCE PROGRAMS

Tidelines, publication of the Cooperative Extension, U.S. Department of Agriculture, University of California, announces the new and updated guide from California Sea Grant, The Directory of Academic Marine Programs in California: A Guide to Programs at California Colleges and Universities. This 82-page, updated guide to marine programs is for both two-year and four-year public and private institutions in California. Courses listed are diverse and prepare for marine-related careers both on the graduate and non-graduate levels.

To order a copy, send your request with a check or money order for $5.00 payable to UC Regents to: California Sea Grant College
University of California
9500 Gilman Drive, Dept. 0232
La Jolla, CA 92093-0232

THE FESTIVUS

A publication of the San Diego Shell Club

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MEMBERSHIP AND SUBSCRIPTION

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The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

The September Party--Saturday September 24th

Come to THE GREEK PARTY! There will be no regular meeting this month.
(See page 100 and map on last page.)

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - August 18, 1994

At 7:35 p.m. the meeting was called to order by President Hugh Bradner. Minutes of the July meeting were approved as published in **The Festivus**.

Guests and new members were introduced and there were a few announcements made.

Reminders for the September party were made by Hugh and a signup sheet for potluck donations was passed. (See col. 2, this page.)

Carole Hertz notified the members of the sad news that Margaret and Dave Mulliner's son, Bruce, had died suddenly.

Two new books were on display. Hans Bertsch brought in a copy of Daniel Gotshall's new book **Guide to Marine Invertebrates: Alaska to Baja California** and John Jackson had an advance copy of volume two of Barry Wilson's **Australian Marine Shells** for members to look at.

Lach Noyes won the door prize and the cookies were furnished this month by John Jackson and Rick Negus.

Larry Buck introduced the two speakers for the night, Richard Herrmann and Charlie Waters, who had just come back from a month-long expedition to Clipperton and the Revillagigedo Islands. Richard showed slides of some of the members of the expedition, telling about their work, and had images of the varied life -- crabs, birds, fish, coral and shells found on the trip as well as shots of Clipperton's barren rocks and beautiful reef. Charlie followed with more slides of the Island's inhabitants as well as some underwater shots (by Ron McPeak) of Charlie fulfilling a lifelong dream of riding a manta ray. This was a very entertaining and instructive program enjoyed by all of those attending.

After the program, club members enjoyed the refreshments and the wonderful exhibits of shells and artifacts that were brought.

Rick Negus

Coastal Cleanup Day in San Diego

The California Coastal Commission's Adopt-A-Beach Program will take place for San Diego County on Saturday, September 24th. Individual action can be taken by combing beaches, parks, rivers and streams for trash.

In 1993 over 50,000 volunteers from the Oregon border to Baja California helped in removing over 500,000 pounds of trash along the 1100 mile coastline.

Call 1-800-COAST-4U for local information on Coastal Cleanup Day.

The Greek Party

The annual September party will be held on the evening of Saturday, September 24th at the Bradner's home (see map, last page).

Members are asked to bring either Greek salad, dessert, wine or a soft drinks contribution. The Club is providing the main dish of moussaka. If you have not signed up for your potluck contribution, contact Marge Bradner (459-7681).

Come to the Greek party. The best people will be there in their Grecian finery enjoying the music, food, and socializing with friends.

Addition to the Roster

New Member

Beals, Marty, 640 So. Isis Ave., Inglewood, CA 90301, (619) 641-9106.

Change of Address

Goldberg, Richard, P.O. Box 6088, Columbia, MD 21046-6088, Tel/FAX (410)379-6583

Shellfish Information Phone Correction

The phone number (published in the July issue of **The Festivus**) for a recorded update on marine toxin activity, special quarantines, or public warnings has changed. The toll-free number is 800-553-4133. (Callers may leave a message for more detailed information.)

COLUMBELLA SONSONATENSIS (MÖRCH, 1860) FROM COCOS ISLAND, COSTA RICA (GASTROPODA: COLUMBELLIDAE)

GIJS C. KRONENBERG

Havenstraat 7, 5611 VE Eindhoven, the Netherlands

In June 1992, Mr. Kim Hutsell found two specimens of columbellid shells while scuba diving at Isla Rafael (Isla Muele), situated at 5°30'N, 36°01'W, in the vicinity of the better known Isla del Coco, Costa Rica (Figures 1-4). Both specimens were found at a depth of 8-9 meters (25-30 ft) under a rock. Both specimens looked very fresh, although the protoconch was broken off of one (Figures 3 & 4). The specimens measure 6.95 and 6.05 mm respectively.

After examination, the two shells appeared to be specimens of *Columbella sonsonatensis* (Mörch, 1860). This species was hitherto not reported from this area (Keen 1971:574, 576; Skoglund, 1992:87, 88) and its finding there establishes a range extension. The specimens are deposited in the author's collection, no. 3462.

I would like to thank Mr. Kim Hutsell of San Diego, California, for putting the shells at my disposal and Mr. Ron Voskuil of Delft, the Netherlands, for photography.

Figures 1 & 2. *Columbella sonsonatensis* (Mörch, 1860), (1) apertural view (2) dorsal view. Locality: Isla San Rafael. Actual size: 6.95 mm.
Figures 3 & 4. *C. sonsonatensis*, (3) apertural view (4) dorsal view. Same locality. Actual size: 6.05 mm (protoconch broken off).

LITERATURE CITED

KEEN, A. MYRA
1971. Sea shells of tropical west America, 2nd edition. Stanford University Press i-xiv + 1064 pp., ca 4000 figs.

SKOGLUND, CAROL
1992. Additions to the Panamic province gastropod (Mollusca) literature 1971 to 1992. The Festivus 24 (suppl.):i-viii + 169 pp.

PARVIORIS FULVESCENS (A. ADAMS, 1866) FROM TONGA

JULES HERTZ

Santa Barbara Museum of Natural History, 2559 Puesta Del Sol Road,
Santa Barbara, California 93105

In The Festivus (Vol. 22(3): 1990), I reported on finding the eulimid *Parvioris fulvescens* (A. Adams, 1866) on the sea star *Pseudarchaster typicus* at Port Douglas, Queensland, Australia. The specimens of *Parvioris fulvescens* figured were juvenile.

On August 30, 1993, I collected a specimen of *Pseudarchaster typicus* with six specimens of the parasitic eulimid *Parvioris fulvescens* at Ano Beach, Utungake, Vava'u Group, Tonga. The sea star was cruising intertidally in a sandy area at low tide. Figure 1 shows the eulimids on the sea star, while Figure 2 is a picture of an adult specimen from that sea star. The little spots that appear in the aperture in Figure 2 are fungi.

I am indebted to Anders Warén for verifying the identities of the sea star and eulimid and to Dave Mulliner for the photography.

Figures 1 and 2. Eulimid *Parvioris fulvescens* on seastar *Pseudarchaster typicus*. (1) Seastar with eulimid specimens attached. (2) *Parvioris fulvescens*, 4.1 mm height from seastar shown in Figure 1. Photos: David K. Mulliner

MELANOIDES TUBERCULATA (GASTROPODA: THIARIDAE) IN SAN DIEGO

CAROLE M. HERTZ

Santa Barbara Museum of Natural History, 2559 Posilipo Road,
Santa Barbara, California 93105

Thanks to the sharp eyes of Richard Cerutti of the Paleontology Department of the San Diego Natural History Museum, another snail is now recorded in San Diego. This time Richard observed a freshwater snail at Chollas Heights Reservoir (Chollas Lake), in San Diego (Figure 1). He first

Figure 1. Detail of map of East San Diego showing Chollas Park and reservoir where *Melanoides tuberculata* were found.

saw the snail in the summer of 1991 at this old reservoir which is no longer used for supplying water to San Diego but is stocked for fishing. He said he'd found them there by the thousands and that there were "loads of them on the bank and in the water, mostly on the north shore." He added that he could stoop down and "pick up twenty to thirty."

In the winter of 1994, Richard again checked the lake and noted that there were fewer snails there. The water was cold and the level of the lake was lowered but he still found living specimens along the bank (Figure 2).

Figure 2. View of area of bank of reservoir in 1994 with specimens of *M. tuberculata*. Photo: Richard Cerutti.

Richard was interested in identifying the species which neither he nor I had seen before. I sent several of the shells to Dr. Barry Roth for identification. He placed them in the genus *Melanoides* in the family Thiaridae and suggested I write to Dr. Joseph C. Britton at Texas Christian University in Fort Worth, Texas for a firm identification.

Dr. Britton kindly identified the specimens as

Melanoides tuberculata (Müller, 1774) (Figure 3), an "Asian native that has been common in spring-fed waters in Florida to Texas for several decades and has spread to a number of western streams in recent years." Dr. Britton didn't think it surprising that *Melanoides* would appear in San Diego.

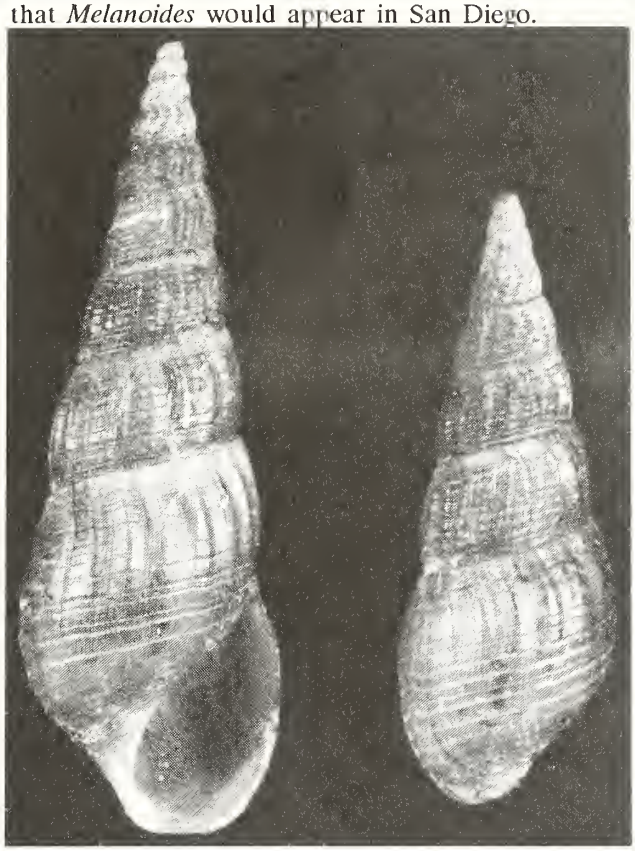

Figure 3. Two specimens of *M. tuberculata* from a lot of nine specimens 15.4 to 31.6 mm in height (SBMNH 142421). Photo: David K. Mulliner.

He sent also a copy of Murray (1971), The Introduction and Spread of Thiarids in the United States, published in **The Biologist** 53(3):133-135. The paper, with an excellent illustration of *M. tuberculata*, notes that thiarids have high rates of reproduction and often displace native snails. In the Orient the species is an intermediate host for the parasite of man, *Clonorchis sinensis*. Murray (1971) summarized that the thiarid snails were probably introduced here by the aquarium industry. He stated that they were at present "widely but sparsely distributed and could become increasingly more important as intermediate hosts for trematodes of animals."

Dr. Britton suggested I notify Dr. Robert Hershler at the Smithsonian Institution who had worked on this group in the past. Dr. Hershler wrote that he had "seen this species in many western springs, including a few in southeastern California (in the Death Valley area, and along the edge of the Salton Sea)." The nine specimens in the lot have been deposited in the Santa Barbara Museum of Natural History (SBMNH 142421).

ACKNOWLEDGMENTS

Drs. Joseph C. Britton, Robert Hershler, and Barry Roth were helpful in determining the identification and distributional information for *Melanoides tuberculata,* Mr. David K. Mulliner photographed the species, and Mr. Richard Cerutti found the species and gave it to me for study for which I thank them.

A PRELIMINARY ANNOUNCEMENT -- WSM '95

The 28th annual meeting of the Western Society of Malacologists will be held at the Resort at Chena Hot Springs, near Fairbanks, Alaska from June 2-6, 1995. The agenda will include contributed papers on all areas of molluscan studies: freshwater, marine, terrestrial, living and fossil. Symposia on ecology and paleocology are being organized with the help of Howard Feder and David Hopkins. Also planned are an auction, reprint sale, and banquet. The University of Alaska Museum Aquatic Collection will be available for visitors both before and after the meeting.

For more information, contact WSM President Nora R. Foster, University of Alaska Museum, 907 Yukon Dr., Fairbanks, AL 99775. Phone: (907) 474-9557. E-mail: FYAQUA@aurora.alaska.edu.

THE FESTIVUS

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Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Diving and Exploring off Western Australia

Dr. Henry Chaney of the Santa Barbara Museum of Natural History has just returned from a three-week trip, as part of a group visiting remote areas of Western Australia. He will give a slide presentation on this trip which was spent exploring areas of northwest Australia not often visited.

Meeting date: October 20, 1991
Shells of the Month: Australian Shells

CONTENTS

CLUB NEWS

The Greek Party

If you weren't there, you missed a terrific party. The Bradner's home and deck were the perfect spot. The view was almost Mediterranean with the tropical plants on the deck and the view of the sea. Some members (besides the hosts) even managed to come in Greek attire this time which added to the fun. Maybe more will try next time.

The food -- Greek salad, pita bread and moussaka, with a lovely assortment of cookies -- was marvelous; Greek music played in the background and the company, as always, was great.

The Club's heartfelt thanks to Marge and Hugh who lent their home for the evening and did most of the planning for this special evening.

A New Book Received for the Club Library

A Review of the North American Freshwater Snail Genus *Pyrgulopsis* (Hydrobiidae)
By: Robert Hershler. 1994.
Smithsonian Contributions to Zoology, no. 554, 115 pages, 53 figures, 2 tables

This review treats the Recent nominal species in the hydrobiid genus *Pyrgulopsis* Call & Pilsbry, 1886, a group of 65 Recent species inhabiting inland waters of North America. The publication will be available for circulation at the October meeting.

The Annual Club Christmas Dinner Party

The Club's annual Christmas Party is scheduled for Saturday evening, December third. It will be catered by the Salmon House Restaurant in a private room separated from the rest of the restaurant. More information on the party at the October and November meetings.

It promises to be a wonderful party, as usual. So mark your calendars and save the date.

Additions and Changes to the Roster

New Member

Inase, John I., 3670 31st St., Apt. H, San Diego, CA 92104. (619) 284-6638

Changes of Address

Buck, Larry, Toni, Lauren & Monica, 13440 Portofino Dr., Del Mar, 92014. (619) 7982-5404

Hollmann, Michael, Goerdelerweg 17, D-37075 Göttingen, Germany. 551-22356 (home) 551-3899-437 (work)

Club Mugs and Pins Available

The specially designed Club mugs, each with three local shells illustrated (*Pteropurpura trialata, Cypraea spadicea* and *Haliotis rufescens*) are still available for purchase in two sizes: standard size at $7 and extra-large at $9. The mugs can be purchased directly at meetings. To order, write to the Club address and please add $2 domestic postage per mug for shipping.

There are still a few Club pins available at $3 each plus 50¢ postage (domestic), when necessary. To order, contact Margaret Mulliner at 5283 Vickie Dr., San Diego, CA 92109, USA or call (619) 488-2701.

COA '95 in San Diego

The 1995 Conchologists of America convention will be held in San Diego on June 23-29th with the San Diego Shell Club as host. The meeting will be at the Pan Pacific Hotel in downtown San Diego near the waterfront.

If you would like to help with preparations for this meeting, your help will be gladly accepted. Contact Convention Chairperson Don Pisor at (619) 279-9342.

MARINE GASTROPOD HABITATS OF WESTERN PANAMA

MICHAEL SMALL

Embajada de Canada, Apartado Postal 105-05
Mexico, D.F. 11580, Mexico

INTRODUCTION

In the months of March and April 1993, I had the opportunity to participate in two expeditions to the western end of Panama's Pacific coast. The first trip from March 7-12, organized by James Ernest of Panama City, focused on intertidal collecting and some dredging around Islas Gobernadora and Cébaco in the Golfo de Montijo. The second trip from April 12-22, organized by Kirstie Kaiser and Dr. Henry Chaney of the Santa Barbara Museum of Natural History, was on the Costa Rica based dive boat **UnderSea Hunter**. This trip involved a diving survey of six small island groups scattered around the large island of Coiba, near the edge of the continental shelf in the Golfo de Chiriquí. The stations surveyed in the two expeditions lie between 7-8 degrees North and 81-82 degrees 30 minutes West. Figure 1 shows the location of the Golfo de Montijo and the Golfo de Chiriquí along the coastline of Panama. Figure 2 identifies the principal stations we surveyed on these two expeditions.

Together, these two expeditions to adjacent areas of Panama's Pacific coast found an impressive number of species and produced a great deal of information about gastropod habitats in the Panamic Province. (While a number of bivalve species were also found on both expeditions, this article does not include them.) This article is an attempt to synthesize my field observations from these two expeditions in order to assist other researchers interested in the gastropods of this region.

GEOGRAPHY

The Golfo de Montijo is a shallow, muddy estuary fed at its northern end by two rivers, the Río San Pedro and the Río San Pablo. In most places it is less than 10 metres deep. There are several forested islands in the middle of the gulf and mangroves along the banks of the river at its upper end. The easiest way of reaching Isla Gobernadora and Isla Cébaco at the southern, oceanward end of the gulf is by river. There is a small river port at Puerto Mutis on the Río San Pedro, about four hours by boat from Isla Gobernadora, which is accessible by a gravel road off the Inter-American Highway. Overall, the gulf is sparsely inhabited. I saw only two settlements: a fishing village of several hundred people on Isla Gobernadora where we stayed and another small settlement on Punta Icaco on the mainland. The hilly landscapes along the shores of the gulf have suffered from extensive deforestation to create cattle pastures.

In contrast, the islands that we visited in the Golfo de Chiriquí are completely uninhabited. I could see no evidence of cultivation on any of them, although the group closest to the mainland, Islas Secas, looked as if it had been logged of its largest trees in the past. They are apparently visited by small fishing and shrimping boats for much of the year. However, during the period in April when we were there, a three month fishing ban was in effect and we saw only a couple of small boats in several of our anchorages. The islands themselves are all fairly similar. They are rounded hills, densely covered in forest, with flowering orchids and bromeliads that come down to the water's edge - a pleasant sight to see when you surface from a dive! They all have steep rocky shorelines, which continue underwater in rocky slopes that are interrupted occasionally by short white sand beaches at the bottom of small bays. Most of the islands have smaller islets and rock outcrops offshore which provide a variety of different dive sites.

Access to these islands is difficult. We chartered the **UnderSea Hunter** out of Puntarenas,

Figure 1. Map of Panama showing the locations of the Golfo de Montijo and the Golfo de Chiriquí.

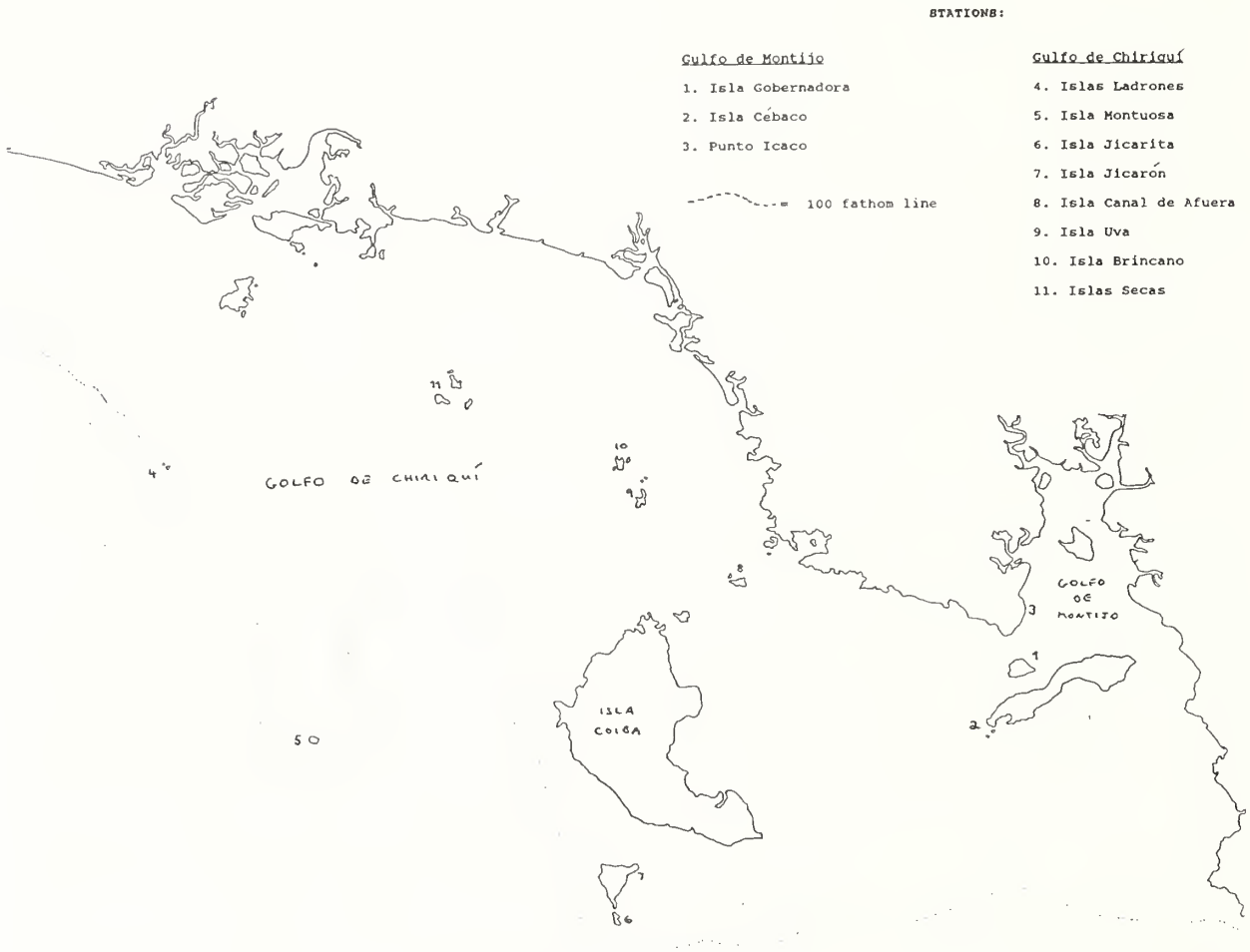


Figure 2. Map identifying the principal stations surveyed on the two expeditions.

Costa Rica, which usually takes divers to Isla del Coco. The alternative would be to take one of the small ferries (which are actually old American amphibious landing craft) that run from Puerto Mutis through the Golfo de Montijo to Isla Coiba, which has settlements on its northeast corner, and then attempt to hire a fishing boat from there. The relative isolation of the island groups we visited, and the fact that they have been seldom dived before, was a major reason why our group chose to visit them.

GASTROPOD HABITATS

The different gastropod habitats that we explored during these two trips could be divided into the following categories, according to water depth and terrain.

INTERTIDAL ZONE: (plus 1.5 to minus 1.5 metres)

Most of the collecting we did in the Golfo de Montijo was intertidal, since it is a shallow gulf with very muddy water that makes snorkelling or SCUBA diving difficult or impossible. Our principal intertidal collecting stations were the southern side of Isla Gobernadora and Punta Icaco on the mainland, on the eastern side of the Gulf. The entire south shore of Isla Gobernadora is covered by rounded grey basaltic stones, resting on fine grey sand. At low tide, the fields of stones form "points", exposed by the receding water between areas of fine sand, or mud closer to the shore. Punta Icaco itself is rocky with many small to medium-sized stones resting on a hard rock substrate. On either side of Punta Icaco there are tidal flats comprised of oozing mud.

In the Golfo de Chiriquí we did virtually no intertidal collecting since the tides were poor at the time we visited and the expedition was equipped for SCUBA. In addition, there are none of the tidal flats which are commonly found around the Golfo de Montijo; the shore lines slope off rapidly around all the islands we visited. However, I collected in very shallow water along the rocky shore at one site on Isla Jicarón that was equivalent to the intertidal habitat in the Golfo de Montijo.

At these various stations the gastropods differed depending on the cover and substrate, as follows:

Rocks on Hard Substrate: Several species of columbellas were abundant in this intertidal environment, including *Columbella fuscata, C. labiosa* and *C. major*. Also common were *Calliostoma macleani, Latirus mediamericanus, Turritella banksi, Anachis scalarina, Cymatium vestitum, Cerithium adustum,* and *Turbo saxosus*. Among the cowries, *Cypraea arabicula* and *C. cervinetta* were very common; *C. robertsi* were less frequent. The most common cone in this environment was *Conus gladiator*.

Rocks on Sand: Many of the same species found under rocks on hard substrate were found in this intertidal environment, but they were not as plentiful (e.g. the columbellas). In addition, a number of different species were evident, particularly in our collecting at Isla Gobernadora at night, which exposed many shells in the sand patches between the rocks. Common species in this environment included *Hexaplex regius, H. radix* and *Murex recurvirostris, Conus purpurascens* and *C. brunneus,* and *Vasum caestus*. Less frequently, the beautiful small *Conus vittatus* (both orange and brown colour forms) and the Panamic volute *Enaeta barnesii* could be found under the stones. Very careful collectors could be rewarded by spotting the occasional *Pterynotus pinniger* clinging to the sides of exposed stones. Given their unusual "camouflage" shape, especially when encrusted in grey-green calcium, these muricids can be very hard to see. By searching the sand patches *Typhisopsis coronatus, Typhisala grandis* and the occasional *T. clarki* could be spotted, often with just their dorsal siphons poking out of the sand. *Acanthotrophon carduus* could also be found in the sand patches.

The rarest cowrie native to western Panama, *Cypraea aequinoctialis* can be found on occasion in this habitat. James Ernest found one large live specimen at night. It was partially exposed beside a small stone on a tidal flat well above the low tide mark on the south side of Isla Gobernadora. The shell had a dusty rose-coloured animal which matched the colour of its base. According to James Ernest, Isla Gobernadora is the only location in the region where *C. aequinoctialis* can be found by intertidal collecting. Otherwise, the shell is found by dredging offshore at depths greater than 100 feet, often inside dead *Spondylus* shells. This suggests that *C. aequinoctialis* prefers the type of silty, low visibility habitat preferred by *C. cervinetta*.

Certainly extensive searching by our group in cleaner water along under-water slopes down to 100 feet in the Golfo de Chiriquí failed to turn up any examples of this rare species. Ernest reports that the deeper water *C. aequinoctialis* are smaller and darker than the intertidal specimens.

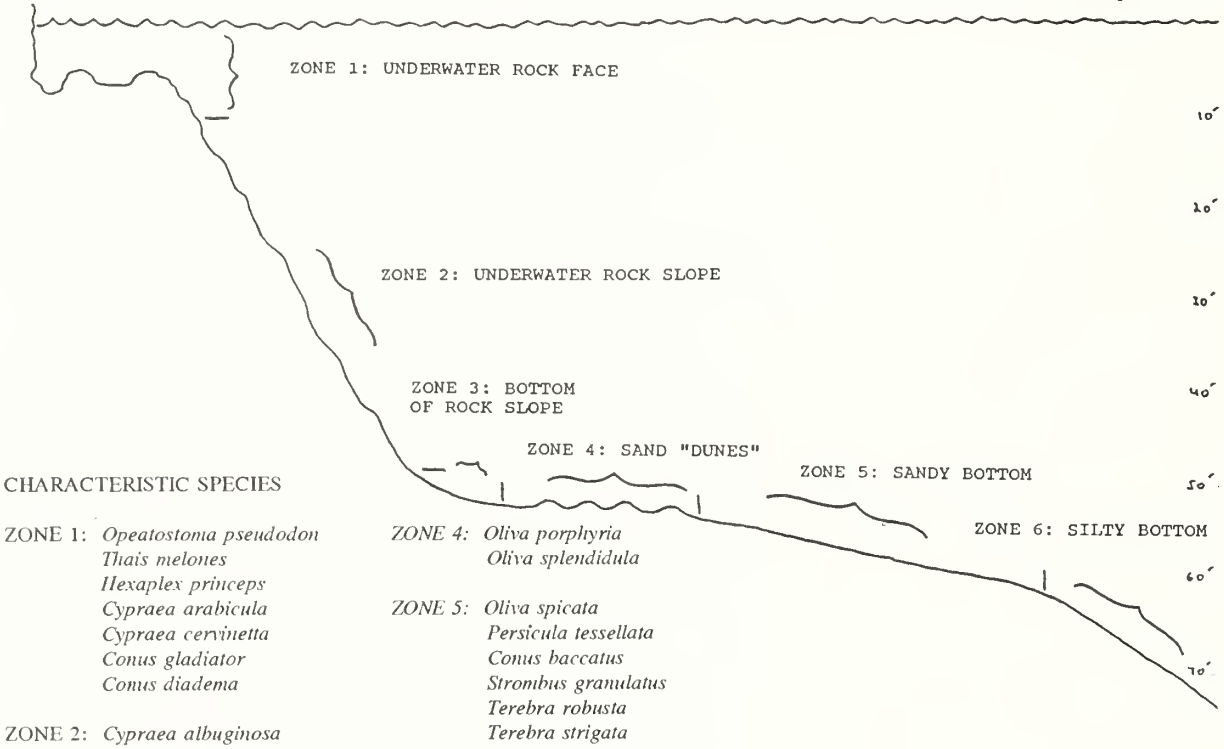
Sandy Flats: During the day, the only two species commonly seen on the intertidal sand flats in Gobernadora were *Strombus gracilior* and the small marginella, *Persicula accola*, which is endemic to western Panama. At night many more species appeared, particularly just after the turn of the low tide when molluscs would suddenly "pop" out of the sand. *Oliva spicata* and *O. polpasta* were plentiful. Other common species were *Natica broderipiana, Distorsio decussata, Terebra strigata, Cancellaria decussata*, and *Subcancilla hindsii*.

Mud Flats: In some areas of the intertidal flats the sand shaded into grey oozing mud. For obvious reasons, we did not spend much time wading through this habitat; but on occasion I had to cross it to get to where I wanted to go. I was rewarded one night by finding a fine *Conus perplexus* moving on top of the mud. *C. purpurascens* were more common in this habitat. *Melongena patula* were also frequent inhabitants of these mud flats. *Natica idiopoma* and *N. elenae* could be found at the edge of the mud, close to where the sand began.

SCUBA ZONE (1.5 to 30 metres)

All of the collecting we did in the Golfo de Chiriquí was done using SCUBA at depths from 1.5 to 30 metres (5-100 ft).

Figure 3 provides a visual cross-section of the characteristic molluscan habitats at these depths among the islands of the Golfo de Chiriquí.



CHARACTERISTIC SPECIES

ZONE 1: *Opeatostoma pseudodon*, *Thais melones*, *Hexaplex princeps*, *Cypraea arabicula*, *Cypraea cervinetta*, *Conus gladiator*, *Conus diadema*

ZONE 2: *Cypraea albuginosa*, *Cypraea alisonae*, *Cypraea isabellamexicana*, *Jenneria pustulata*, *Conus dalli*, *Cymatium pileare macrodon*

ZONE 3: *Strombus galeatus*

ZONE 4: *Oliva porphyria*, *Oliva splendidula*

ZONE 5: *Oliva spicata*, *Persicula tessellata*, *Conus baccatus*, *Strombus granulatus*, *Terebra robusta*, *Terebra strigata*, *Pleuroploca princeps*, *Polystira picta*

ZONE 6: *Hexaplex regius*, *Strombus peruvianus*, *Typhis grandis*, *Conus lucidus*, *Conus archon*

Figure 3. Scuba zone habitats of a typical island in the Golfo de Chiriquí.

Shallow Coral Reefs: There are few coral reefs on the Pacific Coast of Central America compared to the Caribbean. But, from my observation, coral outcrops on rocky slopes become more frequent as you move south from Costa Rican to Panamanian waters. I found dense concentrations of coral in three stations in western Panama: along the shoreline on the northeastern side of Isla Cébaco; in a small bay at the southeastern tip of Isla Cébaco and along the shore in a small bay in Isla Brincano in the Islas Contreras group in the Golfo de Chiriquí. In all three locations, the water was between 0 to 5 metres (0-16 ft) deep, depending on the tide. The predominant coral was the yellow-brown branching coral *Pocillopora damicornis*, with smaller outcroppings of two or three other coral types.

I only found shells in one of these three stations - along the northeast coast of Isla Cébaco. Here you could carefully lift up the clumps of staghorn coral which were not attached to the sandy bottom and look for *Cypraea* underneath in the crevices. At this station we found dozens of large *Jenneria pustulata*, often three or four to a clump of coral, as well as several *Cypraea arabicula, C. robertsi*, and *C. cervinetta* (the unusual dark dwarf form under 40 mm).

Underwater Rock Faces: By this habitat, I refer to smooth rock faces and slopes, often with small crevices and cracks, in heavy surge usually near the tide line. This habitat is found in all the island groups in the Golfo de Chiriquí that we surveyed - most frequently in the top 6 metres of rock outcrops offshore from the main island groups we visited.

The characteristic gastropods in this habitat were rock-clinging muricids, such as *Opeatostoma pseudodon, Thais melones, Neorapana muricata* and *Leucozonia cerata*. By looking carefully on the many pink, red and purple gorgonians on these faces, we found *Simnialena rufa*. Exposed in the small cracks and holes on the rock faces, *Conus diadema* were fairly common, as well as a few *C. gladiator*. (Elsewhere in Costa Rica I have found the solid orange *apogrammatus* form of *Conus princeps*, as well as *C. nux* in the same kind of terrain, but not in the stations we surveyed.) By turning over small stones in cracks in the rock faces, we found *Cypraea arabicula* and *C. cervinetta*. By sifting sand in the small crevices, we found *Morum tuberculosum* (usually dead, but at least one live specimen was found) and the occasional epitoniid (*E. replicatum*).

Underwater Rock Slopes: This was one of two principal habitats we surveyed by SCUBA diving in the outer islands of the Golfo de Chiriquí. Virtually every island has a rock or boulder strewn slope, starting below the low tide line, and then shading onto sand at anywhere from 9 to 30 metres (30-100 ft) in depth. In many places, the rocks are cemented together by sponges underneath. Underneath the rocks are small patches of coarse sand or gravel.

This rocky area is the natural habitat for *Cypraea*. In the depth we tended to work (3 to 15 metres) the most common cowrie was *Cypraea albuginosa* closely followed by *C. isabellamexicana*. The next most common species was a migrant from the Indo-Pacific - one of the *Cypraea teres* complex, which we identified based on the animal as *C. alisonae* (Figure 4). In certain stations this species proved to be the dominant cowrie. Interestingly, about half the time the *C. alisonae* were found in pairs (probably male and female) under the same stone. The only *Conus* commonly found was *C. dalli* - always partially or completely buried in sand under a stone. *Cymatium pileare macrodon* was also common, often two or three living on the underside of a rock. Also found in clusters under small stones was *Jenneria pustulata.*

At a number of stations we came across colonies of mature *Strombus galeatus*. Their characteristic location would be at the bottom of the slope, exposed on a hard substrate, just next to the beginning of the sand in 6 to 12 metres (20-39 ft) of water.

Sandy Bays: All of the islands we visited in the Golfo de Chiriquí had sandy bays in which our boat would anchor. These provided excellent night diving sites off the back of the boat.

In shallower water (5 to 9 metres) the gravel would be coarser and often covered with broad leafed algae. This terrain was relatively poorer in molluscs, although in places dense colonies of juvenile, pastel-coloured *Strombus granulatus* could be found living among the algae. *Conus brunneus* and *C. vittatus* could also be found exposed on the sand. *Vasum caestus* were common. One or two live *Cypraeacassis coarctata* were found at this depth

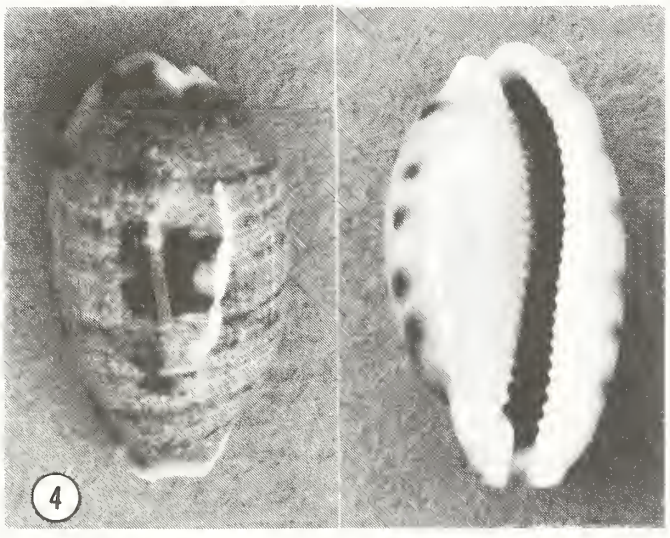
moving on the sand, as well as one juvenile *Malea ringens*. The most productive substrate at this depth were occasional "dunes" of sand, with coarser gravel at the bottom of the ridges, and finer gravel at the top. By carefully looking for raised trails in the sand running counter to the grain of the "dunes", we were able to find many *Oliva porphyria* and *O. splendidula*. In a few sites, there were live coral heads rising from the sand at this depth. At night, *Conus purpurascens* could be found "hunting" on the sides of the coral heads.

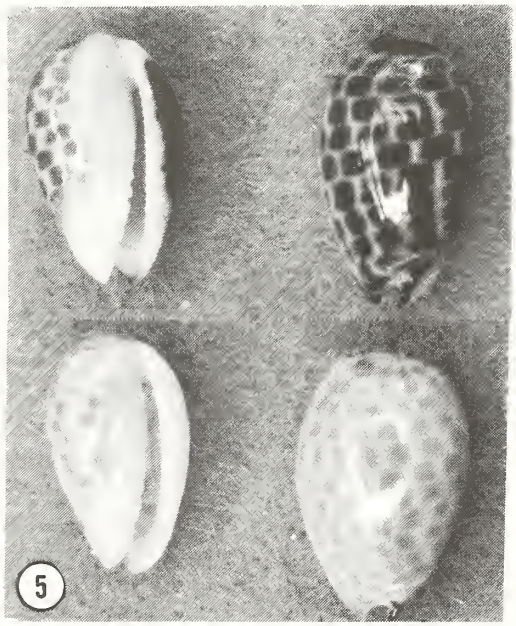
In slightly deeper water, from 9 to 18 metres on flat sand, terebras were abundant, particularly *T. strigata* and *T. robusta*. *Terebra ornata* were less frequent. A wide variety of turrids could also be found; the most common were *Polystira picta* and *Imaclava pilsbryi*. The large *Pleuroploca princeps* with their electric red and blue speckled animals could frequently be found moving across the bottom. In several of the bays the marginella *Persicula tessellata* (Figure 5) were everywhere making trails in the sand. This species is very similar in pattern and shape to the shallow water *P. accola* but the *P. tessellata* we found were about double the size of *P. accola* and tended to have a pale beige or brick red checkerboard pattern, rather than the slate grey squares of the *P. accola*. In other bays in Isla Jicarita and Islas Secas, the small pustulated cone *Conus baccatus* (Figure 6) which is endemic to this area of Panama, were equally common. This cone was found in brown, orange and mauve colour forms. At Islas Ladrones, we found a number of the smaller grey and orange marginella *Prunum woodbridgei* (Figure 7). *Oliva spicata* were frequent, usually the pale fawn coloured form, although we found a few of the striking burnt almond coloured *fuscata* form as well.

On one night dive in Islas Ladrones, one live *Harpa crenata* was found moving on the sand at about 18 metres along with a live *Ficus ventricosa*. On another night dive in Isla Jicarita, I found a pair of large *Fusinus* which I tentatively identified as *F. turris*.

Often the sand on the bottom of these bays would shade into silt below 18 metres. On this substrate, we frequently found very large *Hexaplex regius*, often clinging to clusters of *Spondylus*. More occasionally, *Strombus peruvianus* could be found in twos and threes on top of the silt. By looking carefully, we found several *Typhisala grandis* half buried in the silt, characteristically with their siphons exposed.

At this depth we were also able to find a few specimens of the more uncommon Panamic cones:





Figures 4 & 5. Figure 4. *Cypraea alisonae*, two specimens 40.3 mm and 40.7 mm, found at Islas Secas, Golfo de Chiriquí. Figure 5. *Persicula tessellata*, two specimens 18-19 mm. Bottom, pale colour form found in Islas Ladrones, Golfo de Chiriquí. Top, dark colour form found dredging off Isla Cébaco, Golfo de Montijo. Specimens in M. Small collection. Photos: Julian Izquierdo.

Figures 6 & 7. Figure 6. *Conus baccatus*, 19-20 mm, found at Isla Jicarita and Isla Secas. Top left, mauve colour form; top right, orange colour form; bottom right, mauve form with periostracum; bottom left, brown colour form. Photos: Julian Izquierdo.
Figure 7. *Prunum woodbridgei*, left specimen, 15.0 mm; right specimen, 14.6 mm. From a lot of 5 specimens collected at night at Islas Ladrones, April 14, 1993. Photo: David K. Mulliner. Specimens in M. Small collection.

C. bartschi, C. lucidus, C. archon, and *C. orion*.

DREDGING ZONE: (15 metres plus)

In the Golfo de Montijo we dredged for several afternoons off Isla Cébaco usually at 18 to 24 metres (60-80 ft). The substrate consisted of fine to coarse shell rubble and broken coral. However, the results in terms of range of species was almost identical with the findings from our night diving on sandy bays in the Golfo de Chiriquí at similar depths. Among the few species we found dredging which did not appear in our night dives were the small cones *Conus tornatus* and *C. virgatus* and the small *Oliva kaleontina*. *Typhis* were also more plentiful by dredging - no doubt reflecting the greater difficulty in seeing them in the sand when diving, compared to spotting them on the deck of a boat in the haul from a dredge. Unfortunately, we were not able to take the time to dredge in deeper water below 39 metres (100 ft), which would probably have revealed different species.

COMPARISON OF COLLECTING STATIONS

Compared to many other places in which I have collected, the two dozen different stations surveyed on these two trips proved remarkably uniform in the quality of the collecting habitat. The entire south side of Isla Gobernadora, Golfo de Montijo, is an excellent site for intertidal collecting. In the Golfo de Chiriquí, our group particularly enjoyed the collecting on SCUBA along the underwater slopes and in the sandy bays off Islas Ladrones, Isla Jicarita and Islas Secas. If I had to return to only one place in the Golfo de Chiriquí, it would be Islas Secas - which, of the stations surveyed, was the station closest to the mainland. In a confined area, there are about a dozen large and small islets with many steep slopes and good sandy bottoms in diveable depths in the bays between them. One

could easily spend a week diving in this group and not exhaust all the potential collecting sites.

INDO-PACIFIC SPECIES

One of the principal objectives of our expedition to the Golfo de Chiriquí was to survey the number of Indo-Pacific species we could find in this area along the mainland of Panama. Our aim was to build upon the research that has already been done by Michel Montoya, Don Shasky, Henry Chaney and others on the Indo-Pacific species that appear much further offshore at Isla del Coco, Costa Rica (see, among other articles, Montoya (1983), Shasky (1989) and Chaney (1992)).

On this expedition we found four Indo-Pacific species. Most common were the *Cypraea alisonae* which appeared in almost every island group we surveyed (Figure 4). It seems that this Indo-Pacific species is now firmly established on this stretch of the mainland and nearby islands of Central America.

Three large, live *Mitra mitra* were found on one night dive in sand near coral heads in 10 metres of water in a bay on the western side of Islas Ladrones (Figure 8). James Ernest has found several *M. mitra* elsewhere along the coast of Panama (see Emerson, 1983: 122, figs. 11, 12).

I found one large (49 mm) live *Conus ebraeus* in 1 metre of water under a small stone on a hard-substrate at the southern end of Isla Jicarón (Figure 9). This habitat is characteristic of the species in its normal distribution in the Indo-Pacific. *C. ebraeus* has also been found on the mainland in Guatemala and Costa Rica and it is relatively common at Isla del Coco (see Emerson, 1991:78).

Most tantalizing was a dead *Cypraea lynx* found along an underwater slope in Isla Jicarita. This is the first known record of *C. lynx* in the Panamic province. Since the specimen was dead, we can not be completely certain that it was not deposited there by man - but it is hard to imagine it reaching this uninhabited islet by human hand. Unfortunately, the specimen is not available for further study (see Chaney, 1993).

In addition, on my earlier trip to the Golfo de Montijo, James Ernest found a large live *Cypraea moneta* under a stone on a mud bank intertidally at Punta Icaco. This appears to be the first record of a live *C. moneta* on the Central American mainland.

Figure 8. *Mitra mitra*, 105 and 127 mm, found at Islas Ladrones. Specimens in the M. Small collection. Photo: Julian Izquierdo.

Figure 9. *Conus ebraeus*, 59.4 mm, found at Isla Jicarón. Specimen in the M. Small collection. Photo: Julian Izquierdo

This specimen has been preserved and deposited in the American Museum of Natural History (AMNH 226466) (see Emerson, 1993).

RANGE EXTENSIONS

Apart from the Indo-Pacific species described above, the following Panamic species found on these two trips have not been recorded before from Panama, based on distribution information given in Keen (1971) and Skoglund (1992). Species numbers follow those given in Keen:

977 *Haustellum lividus* (Carpenter, 1857) (Figure 10)
Not recorded before south of Mazatlán, Mexico. Specimen in the collection of Vivienne Smith.

1012 *Aspella hastula* (Reeve, 1844) (Figure 11)
Not recorded before outside the Galápagos. Specimen in the collection of Kirstie Kaiser.

1015 *Dermomurex myrakeenae* (Emerson & D'Attilio, 1970) (Figure 12)
Not recorded before south of Zihuatanejo, Mexico. Specimen in the collection of Vivienne Smith.

1098 *Bailya anomala* (Hinds, 1844) (Figure 13)
Not recorded before south of Guanacaste, Costa Rica. Specimens in the collections of Vivienne Smith and Kirstie Kaiser.

1400 *Prunum woodbridgei* (Hertlein & Strong, 1951) (Figure 7)
Only recorded before from San José, Guatemala. Specimens in the collections of Michael Small, Vivienne Smith and Kirstie Kaiser.

CONCLUSION

Both trips described in this article proved to be very successful in terms of the number and variety of species found. As a new collector to the Panamic region, I was particularly surprised by how plentiful the shells were in virtually every station surveyed. Given the variety of habitats, and the low population density of this region of Central America, it is clear that western Panama will continue to be a rich research area for Panamic province molluscs for many years to come.

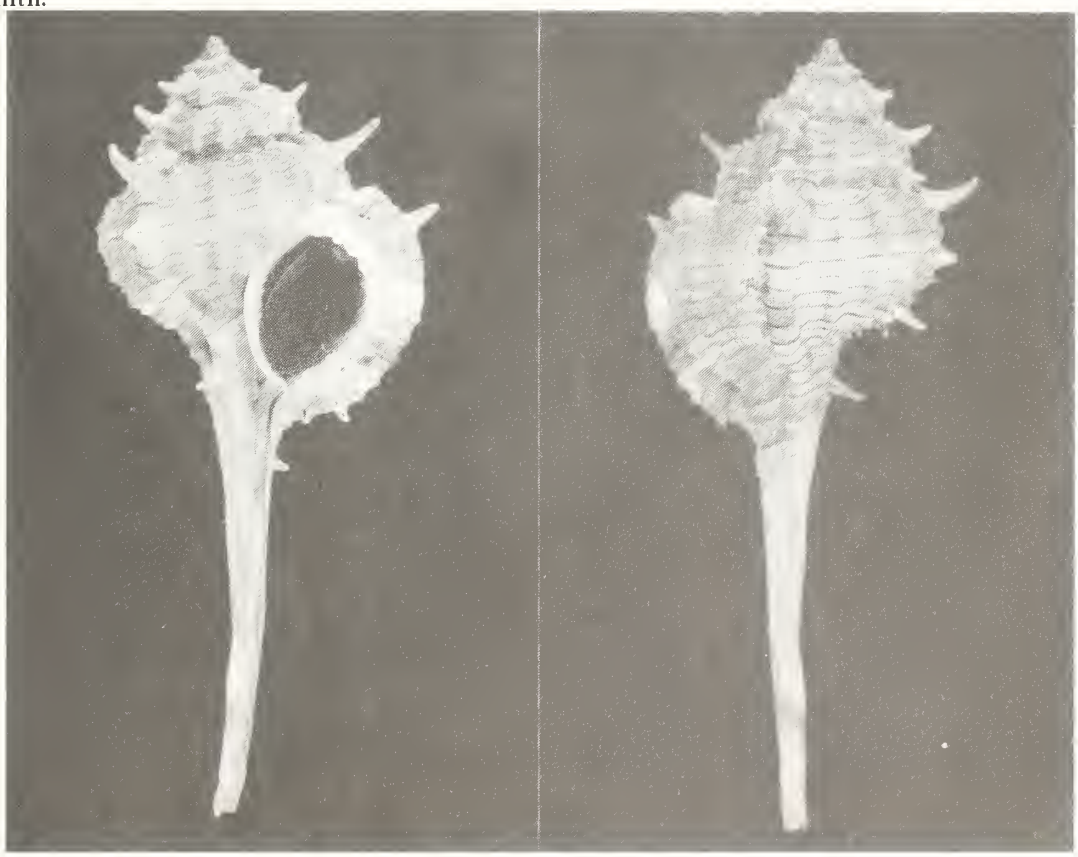


Figure 10. *Haustellum lividus*, 73.5 mm, dredged in 9-12 m (30-40 ft) off Isla Cébaco, Vivienne Smith collection. Photos: David K. Mulliner.

Figure 11. *Aspella hastula*, 11.4 & 10.4 mm, Islas Ladrones, live under rocks in 6-15 m (20-50 ft), 13-14 April 1993. K.L. Kaiser collection. Photo: David K. Mulliner.

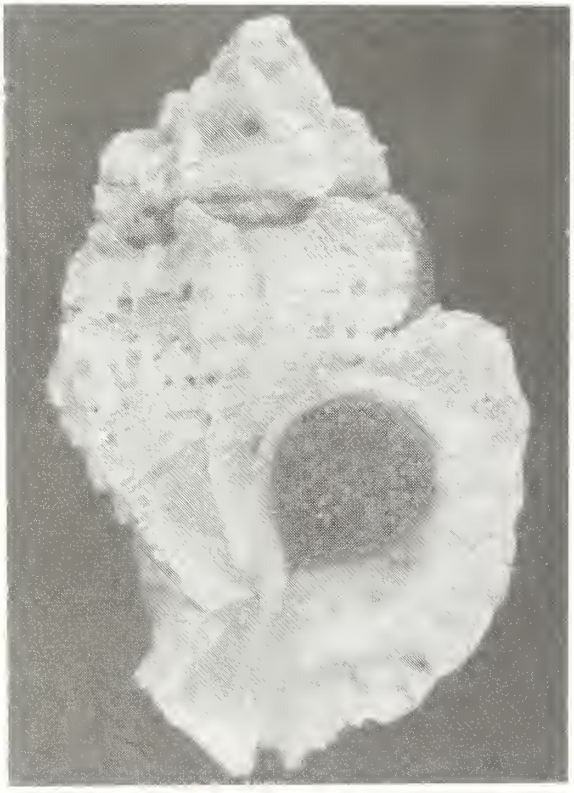


Figure 12. *Aspella myrakeenae*, 14.6 mm, dredged in 46 m (150 ft) at Canal de Afuera, March 1992. Vivienne Smith collection. Photo: David K. Mulliner.

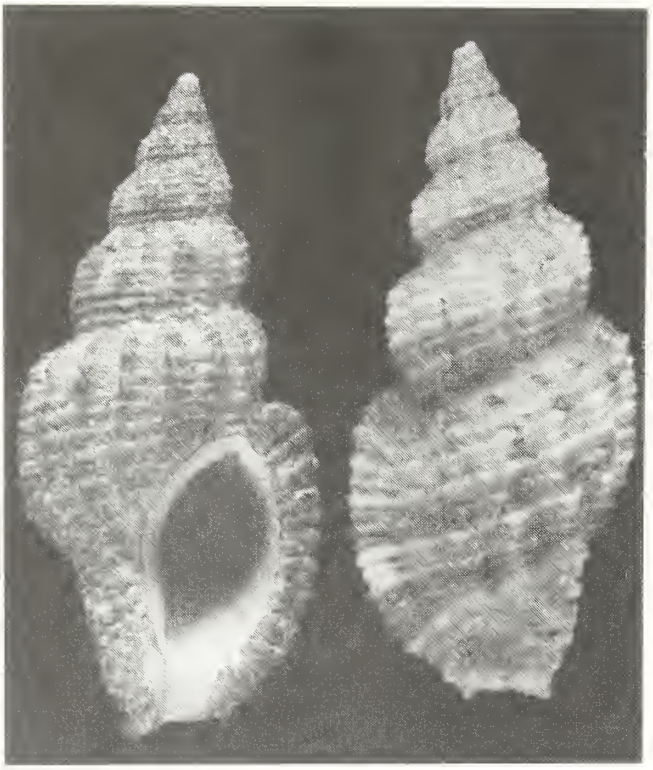


Figure 13. *Bailya anomala*, 16.4 & 16.2 mm, in 8-11 m (25-35 ft), live in rubble under large rocks at Isla Jicarita, 16-18 April 1993. K.L. Kaiser collection. Photo: David K. Mulliner.

ACKNOWLEDGMENTS

I would like to thank all of the friends and fellow collectors who participated with me on both expeditions described in this article, and who greatly improved my understanding of the gastropods of the Panamic province, namely: Juanita and Nece Cacioppo, James Ernest, Betty Jean Piech and Vivienne Smith for the trip to the Golfo de Montijo; Terry Arnold, Marty Beals, Henry Chaney, Terry Gosliner, John Jackson, Anne Joffe, Kirstie Kaiser, Catherine MacMoran, Michel Montoya, Donald Shasky, and Mike Smith for the trip to the Golfo de Chiriquí. I would particularly like to thank Betty Jean Piech, Kirstie Kaiser and Vivienne Smith for their contributions to the species list given in Appendix One, and their loan of specimens for the figures in this article.

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APPENDIX ONE

PROVISIONAL GASTROPOD SPECIES LIST FOR WESTERN PANAMA TRIPS (MARCH-APRIL 1993)

Species identified are based on Keen (1971), as revised by Skoglund (1992). Keen's species numbers, where applicable, are listed before the name of the species. Note that the numerical order may have changed, due to reclassification of the species since the publication of Keen's work. An asterisk indicates a range extension for the species - i.e. the species has not previously been recorded from Panama. "Collector" indicates the initials of at least one person on either of the two trips described who found this species and has a specimen in their collection for examination. Full names and addresses of the collectors are given below. "Trip" indicates the trip on which the collector named collected the species: "a" for the trip to the Golfo de Montijo; "b" for the Golfo de Chiriquí.

	Species	Collector	Trip
	Fissurellidae		
16	*Diodora digueti* (Mabille, 1895)	BJP	a
37	*Fissurella rugosa* Sowerby, 1835	KK	b
	Trochidae		
76	*Calliostoma antonii* Koch *in* Philippi, 1843	BJP	a
89	*Calliostoma rema* Strong, Hanna & Hertlein, 1933	MS	a
106	*Tegula rubroflammulata* Koch *in* Philippi, 1843	KK	b
112	*Tegula verrucosa* Mclean, 1970	MS	a
	Turbinidae		
146	*Turbo saxosus* Wood, 1828	BJP	a
149	*Turbo squamiger* Reeve, 1843	KK	b
155	*Astraea buschii* (Philippi, 1844)	BJP	a
	Neritidae		
167	*Neritina latissima* Broderip, 1833	BJP	a
	Architectonicidae		
425	*Architectonica nobilis* Röding, 1798	MS	b
428	*Heliacus bicanaliculatus* (Valenciennes, 1832)	VS	a
-	*Heliacus* species undetermined	VS	a
	Turritellidae		
434	*Turritella banksi* Reeve, 1849	MS	a
442	*Turritella nodulosa* King & Broderip, 1832	BJP	a
440	*Turritella leucostoma* Valenciennes, 1832	MS	a
444	*Turritella radula* Kiener, 1843-44	MS	b

445	cf *Turritella rubescens* Reeve, 1849	MS	a
	Modulidae		
490	*Modulus catenulatus* (Philippi, 1849)	BJP	a
491	*Modulus cerodes* (A. Adams, 1851)	KK	b
492	*Modulus disculus* (Philippi, 1846)	BJP	b
	Cerithidae		
506	*Cerithium gemmatum* Hinds, 1844	KK	b
507	*Cerithium adustum* Kiener, 1841	MS	b
514	*Cerithium nicaraguense* Pilsbry & Lowe, 1832	BJP	a
516	*Cerithium uncinatum* (Gmelin, 1791)	KK	b
	Planaxidae		
599	*Planaxis planicostatus* Sowerby, 1825	KK	b
	Strombidae		
607	*Strombus gracilior* Sowerby, 1825	MS	a
608	*Strombus granulatus* Swainson, 1822	MS	b
609	*Strombus galeatus* Swainson, 1823	MS	b
610	*Strombus peruvianus* Swainson, 1823	MS	b
	Epitoniidae		
612	*Asperiscala billeeana* (DuShane & Bratcher, 1965)	KK	b
637	*Hirtoscala replicata* (Sowerby, 1844)	KK	b
658	*Nitidiscala staturninata* (Sowerby, 1844)	VS	a
	Vanikoridae		
797	*Vanikoro aperta* (Carpenter, 1864)	KK	b
	Calyptraeidae		
799	*Calyptraea conica* Broderip, 1834	BJP	a
807	*Cheilea corrugata* (Broderip, 1834)	KK	b
808	*Crepidula aculeata* (Gmelin, 1791)	KK	b
811	*Crepidula incurva* (Broderip, 1834)	BJP	a
-	*Crepidula nummaria* Gould, 1846	BJP	a
825	*Crucibulum scutellatum* (Wood, 1828)	KK	b
	Capulidae		
835	*Thyca callista* Berry, 1959	KK	b
	Xenophoridae		
837	*Xenophora conchyliophora* (Born, 1780)	MST	b
	Naticidae		
861	*Natica chemnitzii* Pfeiffer, 1840	BJP	a
864	*Natica idiopoma* Pilsbry & Lowe 1932	KK	b
870	*Natica broderipiana* Récluz, 1844	BJP	a
871	*Natica elcnae* Récluz, 1844	MS	a
874	cf *Polinices caprae* (Philippi, 1852)	KK	b
882	*Polinices uber* (Valenciennes, 1832)	BJP	a
-	*Polinices* species undetermined	BJP	a
	Triviidae		
903	*Trivia pacifica* (Sowerby, 1832)	MB	b
909	cf *Trivia sanguinea* (Sowerby 1832)	KK	b
910	*Trivia solandri* (Sowerby, 1832)	VS	a
915	*Hespererato scabriuscula* (Sowerby, 1832)	KK	b
	Cypraeidae		
919	*Cypraea albuginosa* Gray, 1825	MS	b
922	*Cypraea isabellamexicana* Stearns, 1893	MS	b
925	*Cypraea cervinetta* Kiener, 1843	MS	a
926	*Cypraea moneta* Linnaeus, 1758 (see Emerson, 1993)		a
927	*Cypraea arabicula* Lamarck, 1811	MS	a
929	*Cypraea robertsi* Hidalgo, 1906	MS	a
934	*Cypraea aequinoctialis* (Schilder, 1933)	JC	a
-	*Cypraea alisonae* Burgess, 1982	MS	b
-	*Cypraea lynx* Linnaeus, 1758 (see Chaney, 1993)		b
	Ovulidae		
935	*Cyphoma emarginatum* Sowerby, 1830	MS	a
936	cf *Neosimnia acqualis* (Sowerby, 1832)	KK	b
939	*Simnialena rufa* (Sowerby, 1832)	MS	a

940	*Jenneria pustulata* [Lightfoot, 1786]	MS	a
	Tonnidae		
942	*Malea ringens* (Swainson, 1822)	MS	b
	Cassidae		
947	*Cypraecassis coarctata* (Sowerby, 1825)	MS	a
948	*Semicassis centiquadrata* (Valenciennes, 1832)	KK	b
	Ficidae		
952	*Ficus ventricosa* (Sowerby, 1825)	HC	b
	Ranellidae		
955	*Linatella wicgmanni* (Anton, 1839)	VS	a
959	*Cymatium pileare macrodon* (Valenciennes, 1832)	MS	a
960	*Cymatium vestitum* (Hinds, 1844)	MS	a
961	*Cymatium gibbosum* (Broderip, 1833)	MS	a
	Personidae		
962	*Distorsio constricta constricta* (Broderip, 1833)	BJP	a
963	*Distorsio decussata* (Valenciennes, 1832)	MS	a
	Bursidae		
964	*Bursa corrugata corrugata* (Perry, 1811)	BJP	a
965	*Bursa calcipicta* Dall, 1908	BJP	a
966	*Bufonaria nana* (Broderip & Sowerby, 1829)	KK	b
	Muricidae		
976	*Haustellum recurvirostris* (Broderip, 1833)	MS	b
*977	*Haustellum lividus* (Carpenter, 1857)	VS	a
981	*Chicoreus regius* (Swainson, 1822)	MS	b
984	*Homalocantha oxyacantha* (Broderip, 1833)	VS	a
988	*Murexiella humilis* (Broderip, 1833)	BJP	a
990	*Murexiella lappa* (Broderip, 1833)	BJP	a
991	*Murexiella laurae* Vokes, 1970	VS	a
997	*Murexiella vittata* (Broderip, 1833)	VS	a
1002	*Hexaplex princeps* (Broderip, 1833)	MS	b
1003	*Hexaplex radix* (Gmelin, 1791)	MS	a
1007	*Muricopsis zeteki* Hertelin & Strong, 1951	BJP	a
1011	*Pterynotus pinnigcr* (Broderip, 1833)	MS	a
*1012	*Aspella hastula* (Reeve, 1844)	KK	b
1013	*Aspella pyramidalis* (Broderip, 1833)	BJP	a
1014	*Dermomurex indentatus* (Carpenter, 1857)	BJP	a
*1015	*Dermomurex myrakeenae* (Emerson & D'Attilio, 1970)	VS	a
1016	*Dermomurex obeliscus* (A. Adams, 1853)	BJP	a
1019	*Dermomurex cunninghamae* (Berry, 1964)	VS	a
1021	*Attiliosa nodulosa* (A. Adams, 1855)	KK	b
1022	*Pascula rufonotata* (Carpenter, 1864)	KK	b
1025	*Eupleura nitida* (Broderip, 1833)	KK	b
1027	*Favartia erosa* (Broderip, 1833)	BJP	a
1028	*Favartia incisa* (Broderip, 1833)	MS	b
1029	*Pygmaepterys poormani* (Radwin & D'Attilio, 1976)	VS	a
1030	*Phyllocoma scalariformis* (Broderip, 1833)	VS	a
1040	*Vitularia salebrosa* (King & Broderip, 1832)	MS	a
1041	*Acanthotrophon carduus* (Broderip, 1833)	MS	a
1042	*Acanthotrophon sentus* Berry, 1969	VS	a
1050	*Typhisala clarki* (Keen & Campbell, 1964)	MS	a
1051	*Typhisopsis coronatus* (Broderip, 1833)	MS	a
1052	*Typhisala grandis* (A. Adams, 1855)	MS	a
1058	*Tripterotyphis lowei* (Pilsbry, 1931)	BJP	a
1074	*Mancinella speciosa* (Valenciennes, 1832)	BJP	a
1076	*Thais biserialis* (Blainville, 1832)	MS	a
1081	*Thais melones* (Duclos, 1832)	BJP	a
1095	*Neorapana muricata* (Broderip, 1832)	MS	a
	Coralliophilidae		
1066	*Coralliophila parva* (E. A. Smith, 1877)	KK	b
1071	*Quoyula madreporarum* (Sowerby, 1834)	KK	b
	Buccinidae		

969	*Colubraria lucasensis* Strong & Hertlein, 1937	KK	b
970	*Colubraria ochsneri* Hertlein & Allison, 1968	KK	b
*1098	*Bailya anomala* (Hinds, 1844)	KK	b
1101	*Monostiolum crebristriatum* (Carpenter, 1856)	VS	a
1102	cf *Caducifer nigricostatus* (Reeve, 1846)	KK	b
1109	*Cantharus gemmatus* (Reeve, 1846)	BJP	a
1111	*Cantharus lautus* (Reeve, 1846)	BJP	a
1113	*Cantharus pastinaca* (Reeve, 1846)	MS	a
1115	*Cantharus sanguinolentus* (Duclos, 1833)	KK	b
1127	*Engina maura* (Sowerby, 1832)	BJP	a
1130	*Engina tabogaensis* Bartsch, 1931	BJP	a
-	*Metula* species undetermined	BJP	a
1146	*Phos cumingii* Reeve, 1846	BJP	a
1149	*Triumphis distorta* (Wood, 1828)	BJP	a
	Columbellidae		
1155	*Columbella fuscata* Sowerby, 1832	BJP	a
1157	*Columbella labiosa* Sowerby, 1822	KK	b
1158	*Columbella major* Sowerby, 1832	BJP	a
1161	*Columbella sonsonatensis* (Mörch, 1860)	KK	b
1170	*Anachis lyrata* (Sowerby, 1832)	BJP	a
1171	*Anachis scalarina* (Sowerby 1832)	MS	a
1195	*Anachis varia* (Sowerby, 1832)	BJP	a
-	*Anachis* species undetermined	BJP	a
1207	*Parvanachis milium* (Dall, 1916)	BJP	a
1230	*Microcithara uncinata* (Sowerby, 1832)	KK	b
1239	*Mitrella guttata* (Sowerby, 1832)	KK	b
1262	*Paramctaria macrostoma* (Reeve, 1858)	VS	a
1271	*Strombina elegans* (Sowerby, 1832)	BJP	a
1273	*Sincola gibberula* (Sowerby, 1832)	BJP	a
1277	*Strombina maculosa* (Sowerby, 1832)	KK	b
1281	*Strombina pulcherrima* (Sowerby, 1832)	KK	b
1288	*Strombina turrita* (Sowerby, 1832)	BJP	a
	Melongenidae		
1290	*Melongena patula* (Broderip & Sowerby, 1829)	MS	a
	Nassariidae		
1295	*Nassarius corpulentus* (C.B. Adams, 1852)	MS	a
1314	*Nassarius versicolor* (C.B. Adams, 1852)	MS	b
1319	*Nassarius luteostomus* (Broderip & Sowerby, 1829)	BJP	a
	Fasciolaridae		
1324	*Pleuroploca princeps* (Sowerby, 1825)	MS	b
1328	*Latirus concentricus* (Reeve, 1847)	MS	a
1330	*Latirus mediamericanus* Hertlein & Strong, 1951	MS	a
1336	*Leucozonia cerata* (Wood, 1828)	MS	b
1339	*Opeatostoma pseudodon* (Burrow, 1815)	MS	b
-	cf *Fusinus turris* (Valenciennes, 1840)	MS	b
	Volutidae		
1352	*Enaeta barnesii* (Gray, 1825)	MS	a
	Harpidae		
950	*Morum tuberculosum* (Reeve, 1842)	KK	b
1357	*Harpa crenata* Swainson, 1822	HC	b
	Olividae		
1362	*Oliva kaleontina* Duclos, 1835	BJP	a
1363	*Oliva polpasta* Duclos, 1833	MS	a
1364	*Oliva porphyria* (Linnaeus, 1758)	MS	b
1365	*Oliva spicata* (Röding, 1798)	MS	b
1366	*Oliva splendidula* Sowerby, 1825	MS	b
1367	*Oliva undatella* Lamarck, 1810	MS	a
1379	*Olivella gracilis* (Broderip & Sowerby, 1829)	MS	b
1390	*Olivella volutella* (Lamarck, 1811)	BJP	a
1396	*Olivella zanocta* (Duclos, 1835)	BJP	a
-	*Olivella* species undetermined	MS	a

	Vasidae		
1397	*Vasum caestus* (Broderip, 1833)	MS	b
	Marginellidae		
*1400	*Prunum woodbridgei* (Hertlein & Strong, 1951)	MS	b
1402	*Persicula accola* Roth & Coan, 1968	MS	a
-	*Persicula tessellata* (Lamarck, 1822)	MS	b
1405	*Persicula imbricata* (Hinds, 1844)	KK	b
	Mitridae		
1422	*Mitra effusa* Broderip, 1836	KK	b
1423	*Mitra crenata* Brodrip, 1836	KK	b
1426	*Mitra lens* Wood, 1828	VS	a
1428	*Mitra sphoni* Shasky & Campbell, 1964	KK	b
1429	*Mitra tristis* Broderip, 1836	VS	a
1432	*Mitra muricata* Broderip, 1836	VS	a
1433	*Mitra rupicola* Reeve, 1844	KK	b
-	*Mitra mitra* (Linnaeus, 1758)	MS	b
1434	*Subcancilla attenuata* (Broderip, 1836)	KK	b
1437	*Subcancilla erythrogramma* (Tomlin, 1931)	KK	b
1440	*Subcancilla hindsii* (Reeve, 1844)	BJP	a
	Cancellariidae		
1448	*Cancellaria albida* Hinds, 1843	VS	a
1450	*Cancellaria decussata* Sowerby, 1832	BJP	a
1452	*Cancellaria obesa* Sowerby, 1832	KK	b
1455	*Cancellaria ventricosa* Hinds, 1843	BJP	a
1458	*Cancellaria tessellata* Sowerby, 1832	BJP	a
1460	*Cancellaria indentata* Sowerby, 1832	KK	b
1462	*Cancellaria pulchra* Sowerby, 1832	VS	a
1483	*Trigonostoma breve* (Sowerby, 1832)	VS	a
1485	*Trigonostoma elegantulum* M. Smith, 1947	BJP	a
1486	*Trigonostoma goniostoma* Sowerby, 1832	VS	a
	Conidae		
-	*Conus bartschi* Hanna & Strong, 1949	KK	b
1489	*Conus brunneus* Wood, 1828	MS	a
1491	*Conus diadema* Sowerby, 1834	MS	b
1492	*Conus ebraeus* Linnaeus, 1758	MS	b
1493	*Conus gladiator* Broderip, 1833	MS	b
1494	*Conus princeps* Linnaeus, 1758	MS	a
1499	*Conus orion* Broderip, 1833	KK	b
1500	*Conus purpurascens* Sowerby, 1833	MS	a
1501	*Conus vittatus* Hwass *in* Bruguière, 1792	MS	a
1502	*Conus dalli* Stearns, 1873	MS	b
1503	*Conus lucidus* Wood, 1828	MS	b
1506	*Conus recurvus* Broderip, 1833	MS	b
1509	*Conus virgatus* Reeve, 1849	MS	a
1510	*Conus archon* Broderip, 1833	MS	b
1513	*Conus patricius* Hinds, 1843	BJP	a
1514	*Conus nux* Broderip, 1833	MS	b
1515	*Conus perplexus* Sowerby, 1857	MS	a
1516	*Conus tornatus* Sowerby, 1833	MS	a
-	*Conus mahogani* Reeve, 1843	MS	a
-	*Conus baccatus* Sowerby, 1877	MS	b
	Terebridae		
1525	*Terebra brandi* Bratcher & Burch, 1970	BJP	a
1534	*Terebra glauca* Hinds, 1844	BJP	a
1536	*Terebra formosa* Deshayes, 1857	BJP	a
1540	*Terebra hancocki* Bratcher & Burch, 1970	KK	b
1548	cf *Terebra lucana* Dall, 1908	MS	b
1554	*Terebra ornata* Gray, 1834	MS	b
1560	*Terebra robusta* Hinds, 1844	MS	b
1565	*Terebra specillata* Hinds, 1844	BJP	a
1566	*Terebra strigata* Sowerby, 1825	MS	b

1570	*Terebra tuberculosa* Hinds, 1844	BJP	a
1571	*Terebra variegata* Gray, 1834	BJP	a
	Turridae		
1586	*Calliclava subtilis* McLean & Poorman, 1971	KK	b
1604	cf *Inaclava pilsbryi* Bartsch, 1950	MS	b
1605	*Inaclava unimaculata* (Sowerby, 1834)	KK	b
1615	*Drillia acapulcana* (Lowe, 1935)	BJP	a
1621	*Drillia roscola* (Hertelin & Strong, 1955)	MS	a
1628	*Drillia walteri* (M. Smith, 1946)	BJP	a
1648	*Polystira oxytropis* (Sowerby, 1834)	BJP	a
1649	*Polystira picta* (Reeve, 1843)	MS	b
1690	*Crassispira abdera* (Dall, 1919)	BJP	a
1739	*Compsodrillia haliplexa* (Dall, 1919)	BJP	a
1837	*Daphnella bartschi* Dall, 1919	KK	b
1839	*Daphnella mazatlanica* Pilsbry & Lowe, 1932	VS	a
1840	*Daphnella reusa* McLean & Poorman, 1971	KK	b
-	Turrid species ?	BJP	a
	Bullidae		
2236	*Bulla punctulata* A. Adams *in* Sowerby, 1850	KK	b
	Siphonariidae		
2421	*Siphonaria gigas* Sowerby, 1825	BJP	a

Total: 238 species identified

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THE FESTIVUS

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MEMBERSHIP AND SUBSCRIPTION

Annual dues are payable to San Diego Shell Club. Membership (includes family): $12.00; Overseas (surface mail): $15.00; Overseas (air mail): $30.00. Address all correspondence to the San Diego Shell Club, Inc., c/o 3883 Mt. Blackburn Ave., San Diego, CA 92111

The Festivus is published monthly except December. The publication date appears on the masthead above. Single copies of this issue: $5.00 plus postage.

Meeting date: third Thursday, 7:30 PM
Room 104, Casa Del Prado, Balboa Park

PROGRAM

Collecting Fossil Mollusks in Baja

Club members and fossil collectors Nancy and Bill Schneider will present a slide program, with display of fossil mollusks from their recent trip to Baja California, Mexico.

Mini-auction of books

Meeting date: November 17, 1994
Shells of the Month: fossil mollusks

CONTENTS

CLUB NEWS

From the Minutes - San Diego Shell Club Meeting - October 20, 1994

At 7:40 pm the meeting was called to order by Vice President Larry Buck. Minutes of the August meeting were approved as published in **The Festivus**. Guests were introduced and a few announcements were made.

The board presented the slate of Club officers for 1995. President: Kay Klaus, Vice President: Kim Hutsell, Corresponding Secretary: Rick Negus, Recording Secretary: Silvana Vollero, and Treasurer: Margaret Mulliner. Nominations from the floor will be entertained at the November meeting prior to the election of officers. The new officers will be installed at the Christmas party.

John Jackson presented the Club with the much anticipated volume 2 of Barry Wilson's newest book, **Australian Marine Shells**. The Club is appreciative of John's generous donation of both volumes of this fine book.

The shell drawing was won by Tom Knapik's guest.

Jules Hertz introduced the speaker for the evening, Hank Chaney, curator of mollusks at the Santa Barbara Museum of Natural History, who gave a wonderfully funny and informative slide show of his latest trip to the shores and islands of Northwestern Australia. He had many beautiful shots of the shells of the area as well as the fantastic geological formations found along the northern coast. Member Don Shasky and guest Steve Drogin both accompanied Hank on the trip and showed slides. Don showed some funny people pictures and Steve showed some beautiful underwater slides of the many types of fish and other life to be found there. This was a very entertaining and instructive program enjoyed by all in attendance.

After the program, members enjoyed the refreshments, provided by Kay Klaus, Vi Thomas and Larry Catarius, and discussing their favorite subject, shells.

Rick Negus

Changes to the Roster

Kaiser, Kirstie, Mail Boxes Etc., Suite 078-444, 9279 Siempre Viva Rd., San Diego, CA 92173-3628. Phone: 52 (322) 15041; fax: 52 (322) 15042.

Kent, William R., 3266 First Ave., #24, San Diego, CA 921033. Phone: (619) 293-7008.

Skinner, Drew, (new zip code -- 98337-0046).

The Annual Club Christmas Dinner Party

The San Diego Shell Club Christmas Party will be held Saturday evening December 3, 1994. The party will be in the Starboard Room at Marina Village in Quivira Basin, just south of the Salmon House Restaurant. The room is spacious and will be decorated for the occasion. (See map on last page for directions to the party.) The festivities will begin at 6:00 pm with no-host cocktails. Dinner will be served at 7:00 pm.

The meal will be catered by the Salmon House and dinner will include the following three entrees and vegetables: London Broil with mushroom sauce, Baked Chicken Breast with mushroom sauce and Alderwood Broiled Salmon with parsley potatoes and broccoli with cheese sauce. Also included is a full salad bar, rolls and butter, spice cake and coffee (regular and decaf) and iced tea. The cost is $20.00 per person and includes tax and gratuity. The Club will provide complimentary dinner wine.

Master of Ceremonies, Bill Romer, will preside. Following dinner is the program including a slide show. Members are asked to bring slides relating to something they did, found, saw or enjoyed in 1994. Following that will be the traditional gift exchange. Members (and guests) bring a gift-wrapped shell gift (with collecting information on the inside only) to place under the tree. On the outside indicate only very general locale -- Caribbean, Indo-Pacific etc. Numbers will be drawn and those who bring a shell gift will choose one from under the tree.

Paid reservations must be received by the November meeting. Send checks either to the Club address or to treasurer Margaret Mulliner, 5283 Vickie Dr., San Diego, 92109 or bring to the November meeting. For further information, contact Bill Romer (278-2389).

Plan to come to the party. It's always wonderful fun.

SOME OBSERVATIONS ON *SABINELLA SHASKYI* WARÉN, 1992

GEORGE E. METZ

121 Wild Horse Valley Drive, Novato, California 94947

Eulimids are a specialized group of gastropods. The majority of the species are small, shiny, white shells which all look remarkably alike, making species differentiation difficult, if not frustrating most of the time. They are also very interesting because of their parasitic mode of life. These little mollusks feed on the Echinodermata either full or part time as either endo- or ectoparasites. Some genera of eulimids are predators on specific groups of echinoderms; i.e. starfish, brittle stars, holothurians or urchins, and in some cases they are species-specific in their predation. The members of the group are generally small, about 2 mm or more in size, and therefore difficult to find. The secret is to identify and find the host, then look for the shells.

One of the more unique species in this group is *Sabinella shaskyi* Warén, 1992 (Figure 1). This species preys on the slate pencil urchin, *Eucidaris thouararsi* (Valenciennes, 1846). This species of gastropod was originally reported in the eastern Pacific in 1968 by Don Shasky, who identified it as its Caribbean counterpart, *Roenia nidorum* (Pilsbry, 1956) [now named *Sabinella troglodytes* (Thiele, 1925)]. It, too, is a parasite of a slate pencil urchin, the Caribbean *Eucidaris tribuloides* (Lamarck, 1916). Keen (1971) credited Shasky with discovering the species and identified it as *Stilifer (Pelseneeria) nidorum* (Pilsbry, 1956). Warén (1984) considered the identification erroneous because the larval shell differed from *S. nidorum*, and in Warén (1992), a limited review of the eastern Pacific eulimids, determined that the species was distinct and renamed the species *Sabinella shaskyi* Warén, 1992.

Sabinella shaskyi creates a hollowed space in the tip of the spine of the slate pencil urchin. The spine continues to grow around the shell, producing a protective cavity (Figure 2). Each cavity will usually contain a large shell, the female, and a smaller male. *S. shaskyi* lives, feeds, lays eggs, and probably dies in the gall (Figure 3).

Figure 1. *Sabinella shaskyi* Warén, 1992, from Bahía Escondido, Baja California, Mexico. Leg. George Metz.

The species extends from Ecuador and the Galápagos north to the upper Gulf of California. The shells are small, ranging from 2 to 4 mm in length. The host occurs from just below the low tide line to depths greater than 100 meters. The host is quite common; large ones are entrenched in holes or crevices in the rock and are difficult to extract or examine. The younger hosts are usually under rocks and more easily examined, therefore most of the galls I found were in the younger hosts. Infestation rates are low. In one area, I examined at least 100 urchins to find one with a gall.

Figure 2. *S. shaskyi* shown in the hollowed space of the spine of the slate pencil urchin.

Figure 3. A closeup view of the interior of the gall shown in Figure 2.

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OPHIODERMELLA FANCHERAE (DALL, 1903) (MOLLUSCA: TURRIDAE) FOUND IN THE GULF OF CALIFORNIA, MEXICO

CAROL SKOGLUND
Santa Barbara Museum of Natural History
2559 Puesta del Sol Road, Santa Barbara, California, 93105

Mangilia fancherae Dall, 1903, from the Santa Barbara Channel, California, was described without a figure. Dall (1919) changed the genus to *Moniliopsis* and figured the species. The specimen figured is the holotype (McLean, *in litt*). Distribution was extended south to Point Abreojos, Lower California, Mexico. Later (1921) Dall figured a different, much broader, shell as *Clathrodrillia (Moniliopsis) fancherae,* which has caused much confusion, but has no effect on the identity of the species.

The genus *Ophiodermella* Bartsch, 1944, included those species listed earlier by Dall as *Moniliopsis*.

Poorman & Poorman (1988) reported *Ophioderma cancellata* (Carpenter, 1864) from 100 m off Bahía San Carlos, Sonora, Mexico. McLean (*in litt.*) considers *O. cancellata* to be a distinct, more northern species. The Poormans later listed the San Carlos shells as a probably undescribed *Ophiodermella* species (Skoglund, 1992).

Paul & I had taken a single specimen (Figure 1) from approximately the same locality as the Poorman material. It remained nameless until Dr.

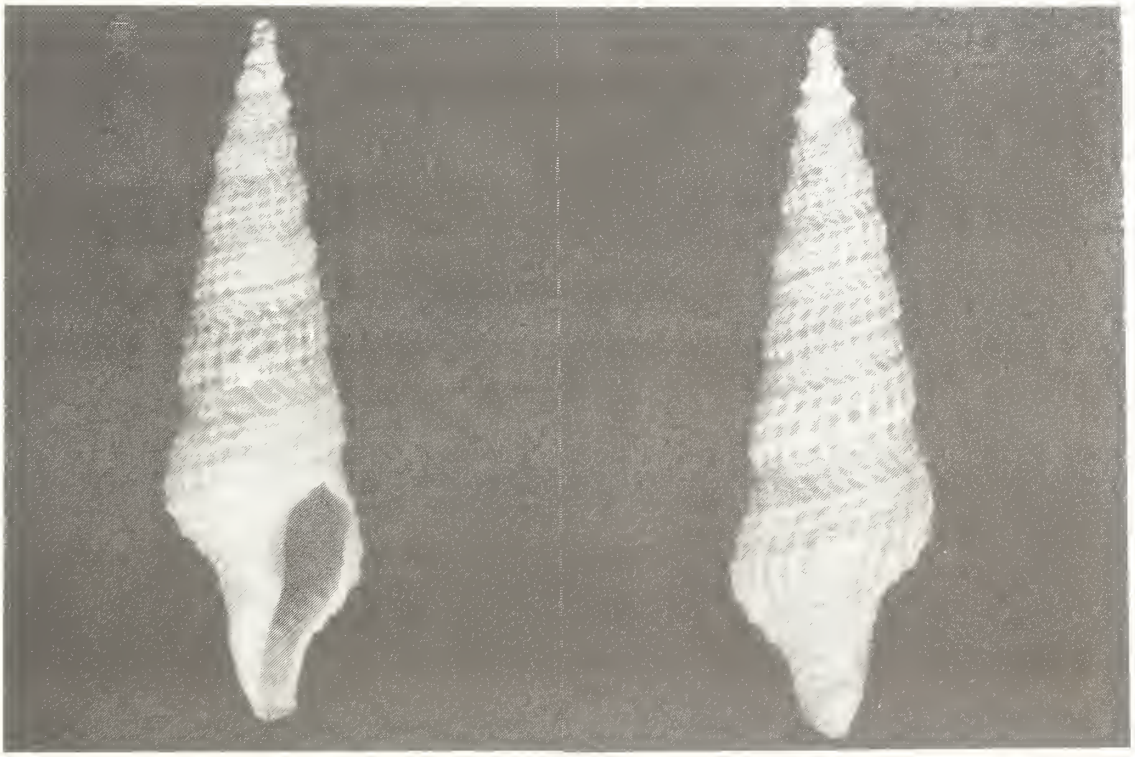

Figure 1. *Ophiodermella fancherae* (Dall, 1903), 17.7 mm in length, apertural and dorsal views. Dredged 60-90 m, 3 mi. SE of Pta. San Antonio, Sonora, Mexico, November 1981. Leg. C. & P. Skoglund. Det. J. H. McLean. Photos: David K. Mulliner.

James H. McLean of the Los Angeles County Museum of Natural History recognized it as *Ophiodermella fancherae* (Dall, 1903). A new look at the Poorman specimens confirmed that they are the same species.

We also have two specimens from off Isla Danzante at 120 to 180 m, and two lots from off Isla Smith, Bahía de los Angeles, Baja California, in 20 to 163 m. The Los Angeles County Museum of Natural History has about 90 lots, representing ranges from Monterey, California, south to the outer coast of Baja California and including four specimens from the Gulf of California, Mexico. The Gulf specimens include three lots from near Isla Angel de la Guarda and one from Isla Espíritu Santo (McLean, *in litt.*).

The above records bring another species thought to occur only in the Californian Province into the Panamic Province on both sides of the Gulf of California, Mexico, and extend the distribution north to Monterey, California.

My sincere appreciation to Dr. McLean for valuable suggestions, the shell identification and the LACM data and to David K. Mulliner for the excellent photographs.

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DUES ARE DUE

Dues are due and payable for 1995. Please see first page for membership rates and the Club address. All memberships include one subscription to **The Festivus** per family. Those not renewing by the end of January will not receive the February issue or be included on the membership roster. All memberships received after October 1994 are considered to be for 1995.

SAN DIEGO'S UNNAMED SPECIES OF *HYPERMASTUS*

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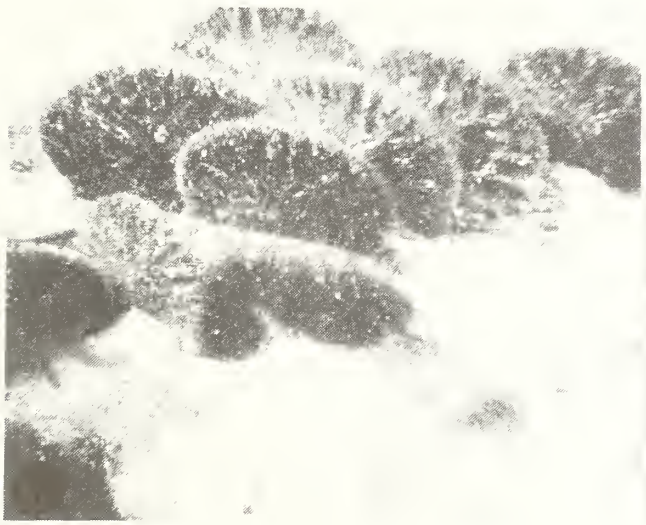
For many years, I have enjoyed (perhaps perversely) searching for snails parasitic on echinoderms. I have photographed assorted species of gastropods which live on spiny-skinned hosts and obtain their nourishment by a proboscis that extracts body fluids from their host-home. These include eulimids on sea cucumbers in Hawaii and the Caribbean, *Melanella* on *Astropecten armatus* Gray, 1840, in Redondo Beach, California, and *Thyca callista* Berry, 1959, in the Gulf of California (Bertsch, 1975a, 1975b & 1985). What a turn-of-tables! What sweet revenge! Snails that dare to eat sea stars or their kin!

You can imagine my pleasure when I dove in the La Jolla Shores region of San Diego, California (32°51'-52°N, 117°15'-16'W) and discovered a small eulimid (4-8 mm long) on the sand dollar *Dendraster excentricus* (Eschscholtz, 1831) (Figures 1 and 2).

Even more remarkable, what had originally been suspected to be *Hypermastus randolphi* (Vanatta, 1899), turns out to be actually an unnamed species of that genus. Dr. Anders Warén recently confirmed its "new species" status at the "Workshop on Micromollusks" at the July 1994 meeting of the Western Society of Malacologists. He will be working on the description of this species, which we illustrate here for the first time *in situ* (Figures 1 and 2) and with the spectacular close-up photography of David Mulliner (Figures 3-5).



Figures 1 and 2. *In situ* photographs of *Dendraster excentricus* organisms with parasitic *Hypermastus* species. Note relative size of host and parasite and the reduced visibility because of sandy bottom habitat. (1) view of area of sand dollar bed with eulimid (2) close-up of eulimid on *Dendraster* host. Photos: Hans Bertsch.

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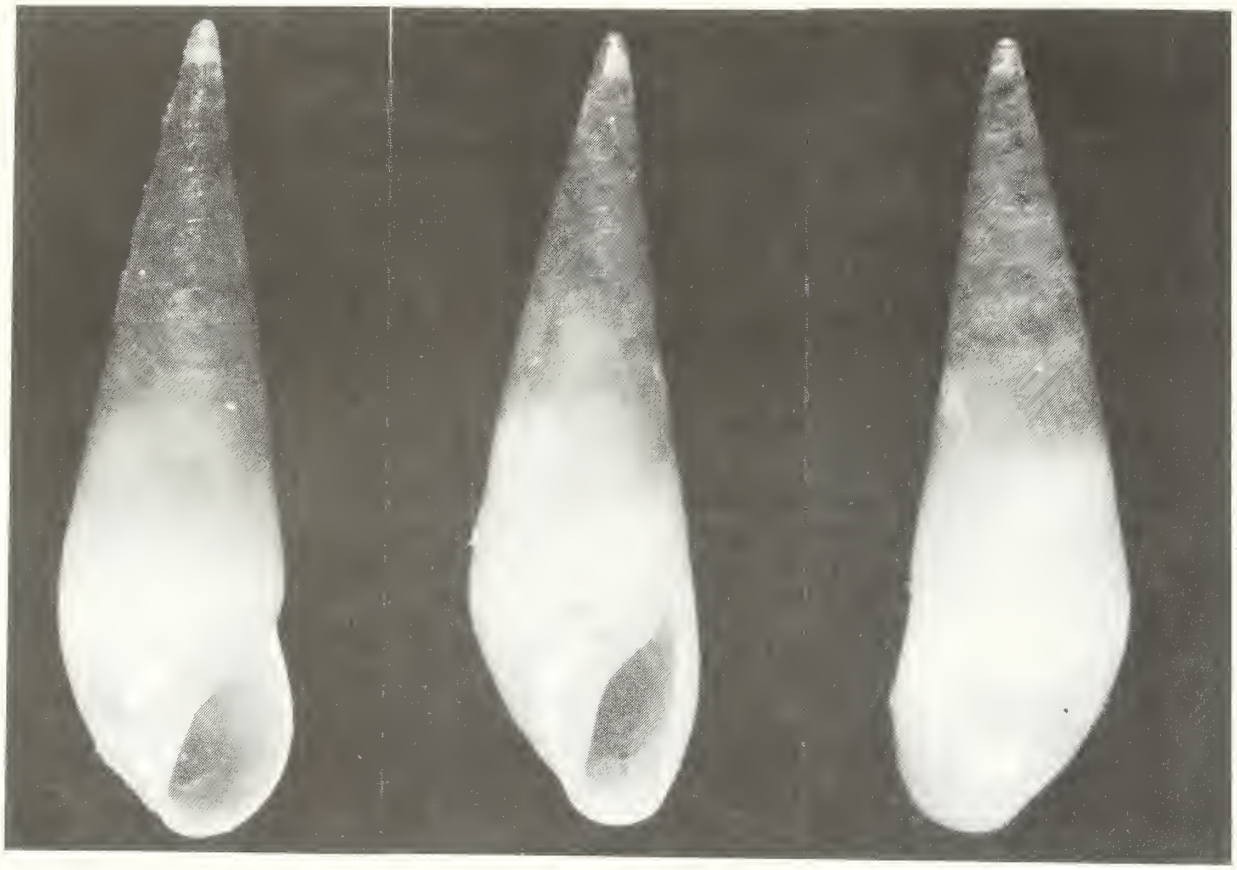

Figures 3-5. Close-up photographs of a specimen of *Hypermastus* sp. Photos: David K. Mulliner.

Compare these photographs with the descriptions and illustrations of *H. randolphi* in Bartsch (1917) and Warén & Crossland (1991).

I have been doing an informal ecological study of this species in its habitat at La Jolla Shores. I have observed specimens of *Hypermastus* species on 24 October 1993, 28 November 1993, 13 February 1994, 27 February 1994, 17 April 1994, 29 May 1994 and 2 July 1994. It occurs in the 4-14 meter depth range (15-45 ft), basically where its host lives (the logic of biology is astounding!).

My preliminary data do not give any information regarding its seasonality, breeding season, or life span. How changing patterns of surf, wave action, and sand movements affect the interrelationship between *Hypermastus* sp. and *Dendraster* are also unknown. Further research is needed. However, I have noted some very real density differences of this new species of *Hypermastus*, obviously correlated with the density of *Dendraster*.

In a preliminary survey on 27 February 1994, I swam through the *Dendraster* beds, counting host and parasite organisms. At the shoreward side of the dense *Dendraster* community between 6 and 8 meters (20-25 ft) deep, I counted 700 specimens of *Dendraster*, on which were 72 *Hypermastus* (60 positioned on the aboral surface, 8 on the oral side, and 4 on the edge). There was an average of one snail per 9.72 *Dendraster*. At 9 meters (30 ft), I counted 82 specimens of *Dendraster,* on which were 34 parasitic snails (a density ratio of 1:2.4). Swimming back from deeper water, between 9 and 14 meters (30-45 ft) deep, I found an incredibly dense and massive bed of *Dendraster* on which were numerous eulimid snails (almost too many to count). Below this bed, I had found several exceptionally heavily parasitized *Dendraster* animals: one with 21 eulimids, another with 13. In this area, most parasitized *Dendraster* had 1-3 eulimids on them (although occasionally there were up to 7).

Dendraster occurs in distinct patches, with varying densities. For the sake of a simple analysis, I

divided them into two gross groups:

(a) Random patches: small clumps of *Dendraster*, always separated by at least 25 cm of barren sand from their next nearest clump (basically the size of the clump was smaller than the distance from the next group), occurring in the depth range of 4-6 meters (15-20 ft) (Site 1 in Table 1).

(b) Dense, thick beds: (no barren sand space throughout an area greater than 1 m^2). I surveyed the shoreward (Site 2) and seaward (Site 3) sides of these beds.

During my observation period, *Hypermastus* sp. was consistently found on *Dendraster excentricus* at the La Jolla Shores, although the density of parasitism greatly varied, apparently in relation to the density and location of its hosts. Table 1 records the results.

Hypermastus sp. has also been seen on the aboral surface of *Astropecten armatus*, on the broken skeletal test of *Lovenia cordiformis* (Agassiz, 1872), and crawling on the sand between hosts in the dense *Dendraster* beds.

Unnamed species of marine organisms occur not only at distant tropical dive sites, but may be found locally! Ironically, the region at La Jolla Shores may be one of the most heavily dived areas in San Diego. However, it is primarily used for training purposes. Once students receive their scuba diving certification, they rarely return to this sandy habitat. I do. Over the years (e.g., see Bertsch & Smith, 1983), I have been pleasantly surprised by the diversity of invertebrates or fish I encounter. Continued careful searching will yield even more biological surprises.

ACKNOWLEDGMENTS

I thank Anders Warén and Jules Hertz for taxonomic aid; David Mulliner for close-up photos of this undescribed species; and Suzanne Bertsch, Carol Zucca, Dave Peters and Tom Smith for scuba diving research assistance.

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TABLE 1

Comparative density of *Hypermastus* sp. at three different sites at La Jolla Shores. (See text for explanation of sites.)

Date	Site 1 (patch)	Site 2 (dense shoreward)	Site 3 (dense, seaward)
(1994)			
17 April	7 per 201 hosts (1:28.7)	55 per 404 hosts (1:7.35)	104 per 96 hosts (1:0.92)
2 July	7 per 132 hosts (1:18.86)	(not counted)	51 per 70 hosts (1:1.37)

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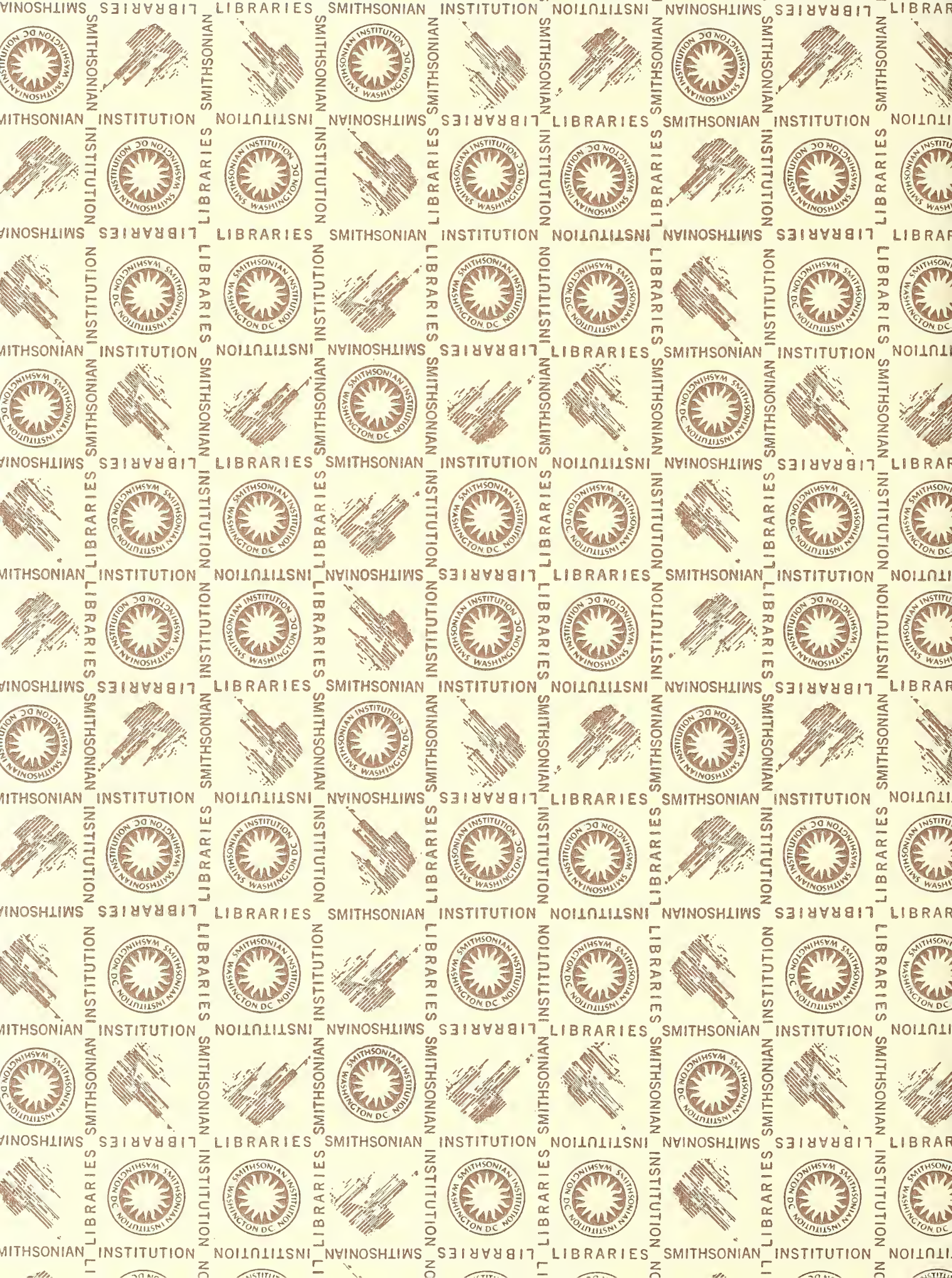
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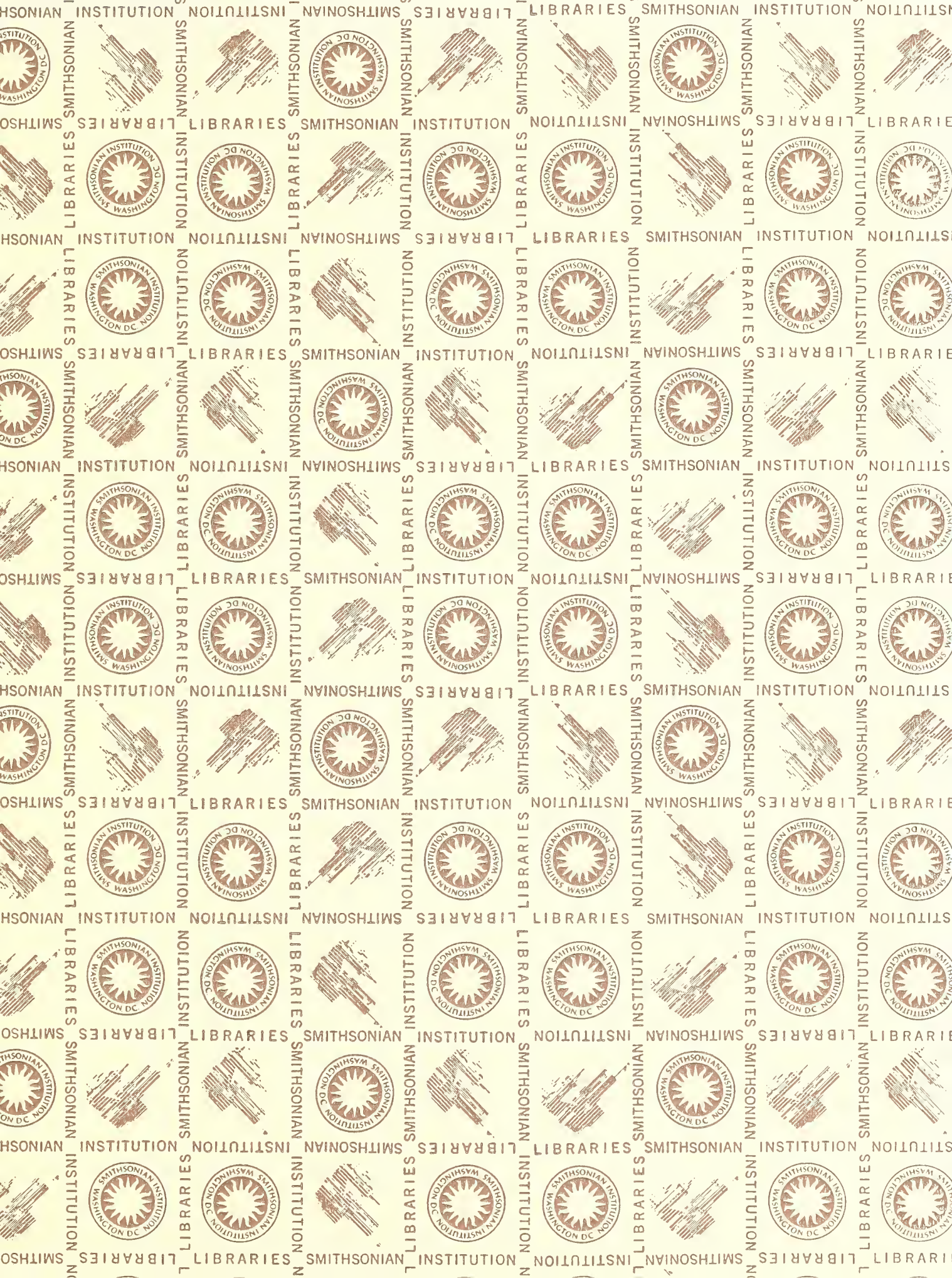
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